

AUGUST

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POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN DO IT

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EST. 1872



SEE PAGE 191



STUDENTS WORKING ON FILM SCANNING MACHINE OF OUR MODERN TELEVISION TRANSMITTER

LEARN RADIO-TELEVISION TALKING PICTURES in 10 WEEKS

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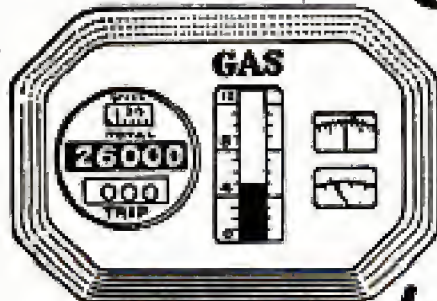
Send me your Big Free Radio Book and all details of your Special Introductory Offer. This does not obligate me in any way.

Name.....

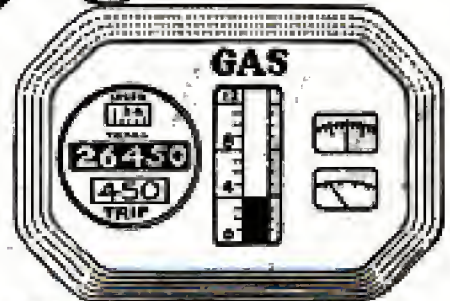
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450 MILES in a gallon of gas



*startling
statement
of famous
Automotive Engineers*



How to increase gasoline mileage has been a problem that Automotive Engineers have been trying for years to solve. Recently a world famous engineer made the statement that the energy produced by burning a gallon of gasoline would run an auto a distance of 450 miles. Other well known authorities go on record as saying that eventually it may be possible to get over four times as much out of gasoline as in the past.

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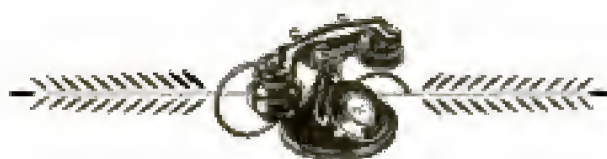
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FOR TELEPHONE SUBSCRIBERS



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... Now Tempered



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MANY men walk today in the company of fear—fear lest the next pay check be the last.

But—here and there you find a man actually advancing—increasing his earnings—bettering his position—forging ahead in times when most people are for their bread and butter.

The reason is easy. The man is not afraid of losing his job. There are many men walking today—men capable of filling any position—ready and eager to do it—any man.

He's a trained man—his training is getting ahead. He's a man who knows how to replace himself—able every day to take the "new" class instead of the "old" class—

He's a man who has stepped into this secure class—into a well-rewarded field—out of the readily replaceable millions?

All right. Read these true records of other men—three out of thousands of similar stories about LaSalle members*—you can do the same—if you will—

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At 24—(his man's formal schooling ended with his twelfth year)—he was a laborer in a railroad shop. Wages were low and hours long.

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* Names on request.

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He stopped school at 15. His first job paid \$20 a month, then \$30 a month and at the time LaSalle first knew him, he was 19 and had worked up to a tracing clerk at \$75 a month. "Wanting more pay, and a future," as he puts it, he enrolled for our Higher Accountancy training. In two months he took a job as assistant bookkeeper and at 21 he was assistant credit manager.

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One of our Industrial Management students in Pennsylvania worked in a group of nine men. When hard times struck, seven were discharged and only himself and one other kept.

Would you be kept if your firm cut the pay roll?

We could give you thousands of examples of LaSalle members—who have no fear of losing their jobs in hard times. This because they know that they have the trained ability which employers need.

For instance, there is our Higher Accountancy student in Delaware

EMPLOYMENT
MANAGER.



who found out
our letter told
telling him of
enrollment

the boss was also an enthusiast. LaSalle student and that the travel auditor to whom the boss reported regularly is a LaSalle graduate.

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**Here's
Proof**



\$100 a week

My earnings in Radio are many times greater than I ever expected they would be when I enrolled. They seldom fall under \$100 a week.
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1937 W. 48th St.,
Norfolk, Va.



Jumped from \$35 to \$100 a week

"Before I entered Radio I was making \$35 a week. Last week I earned \$110 servicing and selling Radios. I owe my success to N. R. I."

J. A. VAUGHN
4075 S. Grand Boulevard,
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\$500 extra in 6 months

"I find I made \$500 from January to May in my spare time. My best week brought me \$107. I should have taken it long ago."

HOYT MOORE
R. R. 3, Box 913,
Indianapolis, Ind.

If you are earning a penny less than \$50 a week, send for my book of information on the opportunities in Radio. It is free. Clip the coupon NOW. Why be satisfied with \$25, \$30 or \$40 a week for longer than the short time it takes to get ready for Radio?

Radio's growth opening hundreds of \$50, \$75, \$100 a week jobs every year

In about ten years Radio has grown from a \$2,000,000 to a \$1,000,000,000 industry. Over 300,000 jobs have been created. Hundreds more are being opened every year by its continued growth. Many men and young men with the right training—the kind of training I give you—are stepping into Radio at two and three times their former salaries.

You have many jobs to choose from

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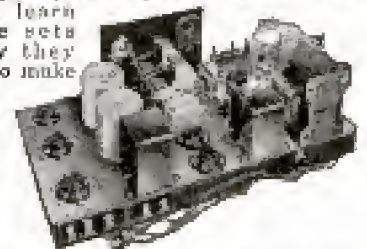
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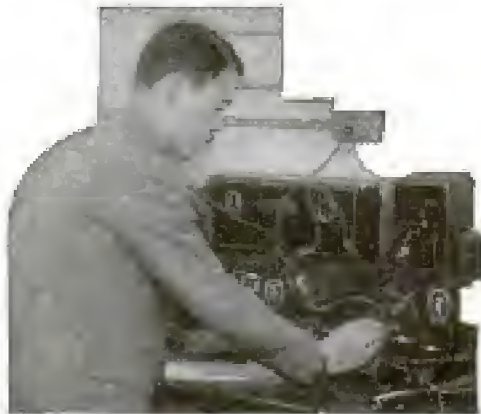
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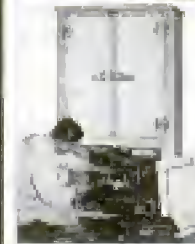
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Modern machinery has certainly helped us to have better things at lower prices. And up to a certain point, machinery helped working people by providing more and more jobs, in order to keep up with popular demands for new items.

But recently—in the last ten years or so, that is—modern machinery has taken on a new significance. It has passed the stage where it helps men to get jobs. It has begun to throw them out of their trades. Notice that—it is the trades, not the jobs alone, that are being taken away from the average worker. Not only in the shop and the factory, but in the office and the store, mechanical devices are replacing from one to twenty men at a time.

A Government report, which states that in the past seven years no fewer than two million men were thrown out of jobs by machines, will show you how serious this mechanical competition is becoming. It isn't just as though these fellows lost single jobs—they lost their chances of getting jobs in the trades where they were skilled. Instead of being able to go up, through their knowledge, to higher, better-paid positions—even though slowly—they found themselves pitchforked into the ranks of unskilled labor, practically speaking. Machine competition often forced—and is now forcing—men who have lost their trades to take lower-paid, less highly-skilled positions.

This has been the serious problem of two million men in the last seven years. It will be more serious for more millions in the years to come. A few men—comparatively speaking, that is—are going to find machine competition a real blessing. Those few thousands are the ones who realize that, if they have lost their jobs in the producing end of business, they can get better ones in the selling end. No machine can ever sell—except perhaps a penny-in-the-slot machine. And on the other hand, the increasing production of machines must be sold.

Economists and editors have clamored for ten years, saying that we are neglecting the selling end of business, in order to develop the production end. Some of them have gone so far as to say that if there had been enough trained salesmen in the world, the recent depression would have been prevented. One thing is certain—that in the next ten years we will pay as much attention to training our salesmen as we have paid, in the past, to building up our manufacturing methods. Now, when this interest in intelligent selling is beginning, is the time for foresighted men. The man who trains himself now, to make the most of the new salesmanship, will be the man who will never lose his job to a machine. On the contrary—the machine will work for him, providing him a richly-paid job for the rest of his life.

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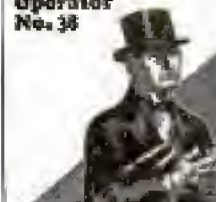
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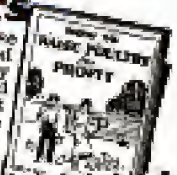
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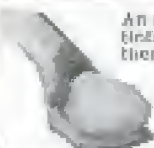
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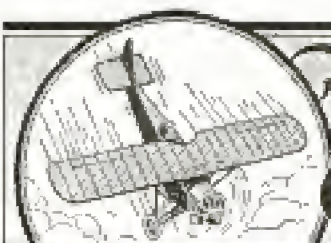
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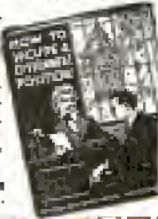
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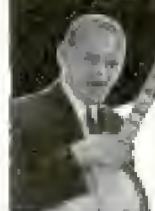
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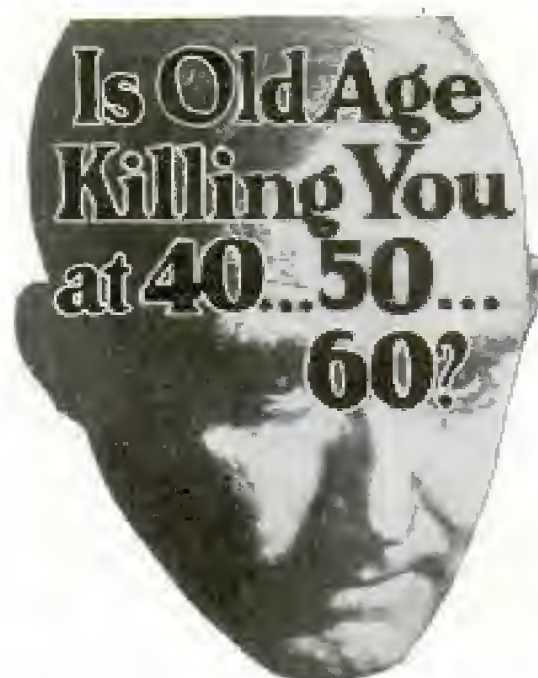
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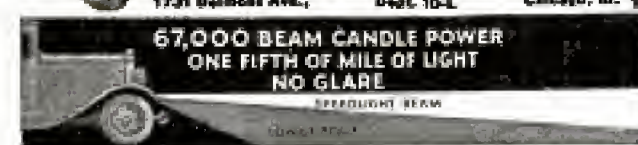


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20x20	2.40	20x20	2.40	20x20	2.40
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20x96	6.20	20x96	6.20	20x96	6.20
20x97	6.25	20x97	6.25	20x97	6.25
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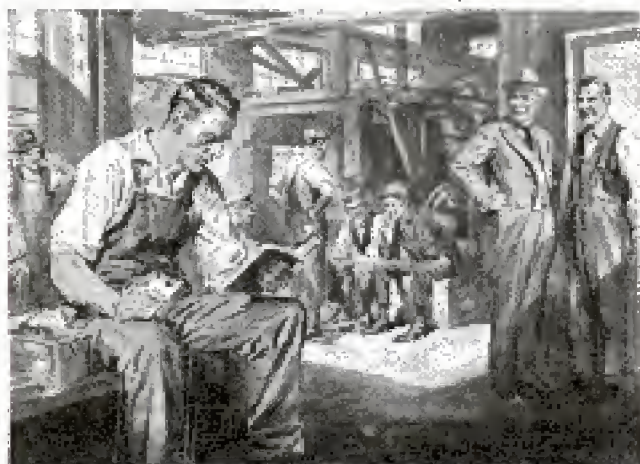
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POLMET Polishing Cloth Removes Tar-nish from all metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Details 25c; sample free. Gale & Co., Inc., 15 Ellsworth St., Boston, Mass.

HIG Profit Selling Groceries, Major QUA, Patent, Stock Minerals. Sample Case free. Loeven & Brown, 1605-T So. State St., Chicago.

AGENTS. Build a volume repeat business in your territory with nationally known Auto Beauty Kit. Fast seller. Big profits. State previous selling experience. Territory covered. U. S. Mfg. Corp., Dept. A, Decatur, Ill.

HIG Pay giving away Shirts, Hosiery, Underwear. Also Lumberjackets. Smashing free offers with orders. Every man buys. No experience needed. We teach you and supply complete sample equipment free. Write Today, Dept. A25, Albert Shirts, 500 Sixth Ave., New York.

HIG Profit Catalog—Guaranteed portraits, frames, medallions, photo pillows, household specialties, toilet preparations, food products, remedies, pictures, crucifixes, religious goods. James Bailey Co., Station C-8, Chicago.

250,000 ARTICLES Wholesale—Directory 16c. W-Patterson, 4111 University, Des Moines, Iowa.

35 CHRISTMAS Cards sells for \$1.40 (worth \$1.75). No two alike. Agents and district managers wanted. 51% profit. Sample \$1.00. Talbert Novelty Company, Hager Street, Buffalo, N. Y.

I'VE placed 5,000 men in good paying jobs selling Shirts, Ties, Underwear, Hosiery, Workshirts, Lumberjackets, etc. I'll give you a marvelous outfit free. Remarkable values get orders and requests. Big cash commissions and bonuses. Write Dept. H8, Quaker, 1167 Broadway, New York.

JUST Out—latest thing. Monogrammed Door-Mats. Attractive patterns and colors with individual monogram. Women buy on sight. Most homes need two. Durable rubber. Outwears three ordinary doormats. Agents seeking clean-up. 47 other fast selling rubber specialties. Big catalog and money making information free. Kristine Mfg. Co., 1418 Bar St., Akron, Ohio.

SOMETHING The housewives want. A signed guarantee to save money and time in cooking. No competition. 49% profit. No license required. Station C, Box 25E, San Diego, Calif.

MIRROBS Resilient at Home. Costs near 5 cents per square foot, you charge 75 cents. Profitable business selling autographs, reflections, tableware, glasses, refashioning jewelry, etc. Outfits furnished, details free. Write, Sprinkle, Plater, 128 Marion, Ind.

BRAND New Money-Maker! Good for \$2.00 an hour. Wonderful article. Sells like wildfire. Carry right with you. Particulars free. Albert Mills, 9135 Montauk, Cincinnati, O.

STEP Into big money with Work Clothes. Every man needs Pants, Jiroches, Coveralls. Lowwear's 4 complete lines sell on sight. Cash in your pocket every day. Sell free with every 3 complete outfit free. Dept. P8, Longwear, 480 Broome St., New York.

CASH Paid for butterflies, insects. See Sinclair Display Advertisement on page 13.

100% PROFIT Selling Mystery Gas Lighter. Details 25c. Costs you \$1.00 doz. Sample free. Square Deal Mfg., Desk PM-22, Bradford, Pa.

WANTED Reliable, energetic men to supply famous Watkins products to satisfied customers. 150 household necessities favorably known everywhere. Earnings \$25 to \$100 weekly. Write at once. J. R. Watkins Company, Dept. PM831, Winona, Minnesota.

STRANGE Ironing cord. Prevents stretching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephone also. 100% profit. Samples furnished. Neerkin, Dept. 8-A, 4503 Raymond, Chicago.

ELECTRIC Water heater—New. Heats water instantly. Pocket size—retails \$3.75. Two minute demonstration makes you \$1.05 profit. Lux-Viel, Dept. 57, Elkhart, Ind.

ABSOLUTELY Brand new. Hand-colored popular priced pencil portraits going big. Erroneous wants them. Make \$10-\$25 daily. Samples furnished. Cruiser, 2402-118 Jackson, Chicago.

HOLLOW Ground blades for double edge razors; ten cent packages, easy selling. Carried. Sold everywhere. Standard Safety Razor, Pittsburgh, Pa.

START Your own Christmas Card business. Personal and box assortments. Sample books and supplies furnished. Large profits. Season just starting. Get free details. Dollar Card Manufacturers, New Brunswick, New Jersey.

100% PROFIT With Margo Bottle Meth Preventive and Deodorant. Instant seller everywhere. Send \$1.00 for four full-sized samples postpaid. Money back if not satisfied. Margo, 900 Chestnut, Philadelphia, Pa.

EARN Real money selling "Zipp-Over" wonder dust soap. Fits over any loam. Every home needs, wants, likes, and buys one or more. "Zipp-Over" Mfg. Company, St. Paul, Minn.

SIGN Salesmen let us tell you about a New Changeable Sign that sells for \$1.65 and gives you 400% profit. National Sign System, St. Louis, Mo.

BEAUTIFUL Gold window letters. 2 in. 2c each; 3 in. 2 1/2c; 4 in. 3c; 6 in. 6c. Sample 4c. Midland Sign System. 628 W. Warren, Detroit, Mich.

CHANCE For all daily introduces themselves new discovery. Write for samples. Territory. Vanl Company, Care Tower, Cincinnati, O.

GIVE Away Ladies' Pure Thread Silk Stockings with wonderful value \$1.40 sets of Paris Tulletries. 100% profit. Paris Laboratories, 2145 Locust Blvd., St. Louis, Mo.

HIG Profits—Sells like hot cakes. Box 263 St. Paul, Minn.

NEW Automatic Washer. Cleanses and sterilizes clothes quickly. No rubbing. No electricity. Fast seller! Price \$7.50. Automatic selling plant. Agents reap big repeat profits! Write Every Laundry Co., 2601 Enright, St. Louis, Mo.

I'VE Placed 5,000 men in good paying jobs selling Shirts, Ties, Underwear, Hosiery, Workshirts, Lumberjackets, etc. I'll give you a marvelous outfit free. Remarkable values get orders and requests. Big cash commissions and bonuses. Write Dept. H8, Quaker, 1167 Broadway, New York.

SELL Fun! Everybody smiles, laughs, buys new joke novelties we manufacture. Real profits! Mesquique, 5654 Submarine Station, Daytona Beach, Fla.

100% PROFIT In new mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retails 50c. Sample and sales plan 25c. New Method Manufacturing Co., Box PM-8, Bradford, Pa.

GUARANTEED Hosiery—Lowest mill prices, men's latest fancy hose—doz. \$1.50, \$1.50, Ladies' silk hosiery—doz. \$2.90-\$3.50. Catalogue free. Superior Knitline Company, Dept. 34, New Haven, Conn.

ADDRESSES—Hundreds of wholesale and agent supply houses. Particulars free. J. Belfort, 4042 No. Keeler Ave., Chicago.

WANT A good one! See Danimo advertisement under "Business Opportunities."

FREE Formula Catalog. Agents fast demonstrators. Western Chemical, Salem, Oregon.

ELECTRIFY Any clock! New, inexpensive, profitable. "Lektropolis," 2945 Pullerton, Chicago.

PHOTO Metallisms. Send for latest catalogue. Hundreds of our newest designs. Photo novelties. Lowest prices. Quick service. Medallion Novelty Co., Inc., 208 Bowers, New York, N. Y.

AGENTS Wanted to sell electric, battery radios and tubes. Bright Radio, 3240 Lawrence Ave., Chicago, Ill.

500% PROFIT! Gold and colored sign letters for windows, trucks, signs. Easily applied. Big demand. Neonite, Akron, O.

AUTOMATIC Gas or cigar lighter. No friction. Sample 25c. Lighter Co., 88 James St., Montreal, Canada.

NEW Fast-selling Bump Paper Vastness for stores, offices, banks, factories. Demonstration sells it. Selling supplies free. Commissions paid weekly. First replies your territory given preference. Write quick. Bump Co., Dept. P-8, La Crosse, Wis.

AMAZING New electric trouser presser popular for \$25 daily; puts razor edge in pants in 10 seconds, sells for \$2.50; year commission \$1.00. Sample fits pocket. Muny Mfg. Co., Dept. C-88, 217 Main St., Cincinnati, Ohio.

SOUND Tells weather chart. 90 cents postpaid. Agents wanted. W. R. Harrington, Connell, Wash.

NEWEST Invention! Ankle Supports Sock. Circulation Unobstructed. Extreme Comfort. Pair 50 Cents. Dr. Henson Wall, 5150 Roseland Road, Chicago.

SEE National Campaign ad under Salesmen Wanted. CTP., St. Louis.

THE Christmas dirt removing mail double cone map wringer. Price \$2.20. H. K. Christensen, Mfg., Ft. Atkinson, Wis.

THAXLY Formulas produce perfect products. All lines. Catalog free. B. Thaxly Co., Washington, D. C.

CALIFORNIA Perfumed genuine beads, sell like hotcakes. Factory prices, full line. Eastern headquarters Rulmer Mfg. Co., 33-22 Northern Boulevard, Long Island City, New York.

NEW Hemstitcher. It's different. Agents, demonstrators wanted everywhere. Money making wonder line. Samples 10c, retails 30c and dollar. K J Manufacturing, 648 N. Vermont, Los Angeles, Calif.

MAGCLOTH. World's best polishing cloth. For all metals. Quick sales; big profits. Sample free. MagCloth, 3217 Summit, Kansas City, Mo.

MAKE Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Brook, Richmond, Va.

AGENTS—Something new! Make old style clocks into electric clocks. Anyone can attach. Low price. Free details. Restover Clock Co., 4318-P Irving Park, Chicago.

AGENTS For handstick; original patented handsoap. Approved Good-Housekeeping. Everybody customer. Fine opportunity for hustler. Sample free. Solar Products, J-2144 So. Troy, Chicago.

SUCCESS With your own products. Make-and then yourself. Formulas, processes, trade-secrets. Expert analytical service. Catalog free. H. Thibault Co., Washington, D. C.

SELL Perfume Incense. Wonderful proposition. Particulars free. Law Laboratories, 72 East 113th Street, New York.

SELL Stores & corded breathers, etc. Latex Products, Albany, N. Y.

THIS Advertisement may make you thousands of dollars. If you write immediately for my "Eye-Opening" literature describing guaranteed formulas; valuable trade processes; money-making information how to easily make the world's best-selling specialties. All lines. Investment small. Profits immense! Start in your home, room or office. Make the good money you're entitled to. Dr. Leconte Miller, Chemist, Tampa, Fla.

CHICAGO Expert valued 23 stone at \$504. The diamond's only guaranteed rival. Greatest space time, gold-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick. Meridian Gem Company, Dept. 14, Monterey, Calif.

FREE "Booklet of money making opportunities." new ideas, original plans, money making secrets and other valuable information. None require peddling or outfits. Elsie Co., 24 Elizabeth St., New York.

SELL 33 Garage door holders, simple, automatic, quickly installed. Interest-free garage owners, builders, everywhere. Exclusive territory proposition. Knowlton-Stevenson Co., Ann Arbor, Mich.

MAKE Your own products. Employer agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950 W. Broad, Richmond, Va.

FLAVORING Extracts—Build yourself! Labels furnished. 600% profits! Whirlwind money-maker! Repeated! Free offer. Thomas Manufacturing Company, Indianapolis, Ind.

CALIFORNIA Perfumed Leads, selling like hot cakes. Agents earning money. Catalog free. Mission Factory, P. 2325 W. Pico, Los Angeles, Calif.

\$50-200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-E North Clark, Chicago.

WE Start you without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 641, St. Louis, Mo.

AGENTS—Make a dollar an hour. Sell Mentals, a patented patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404, Amsterdam, N. Y.

PHOTO Medallion men and women, the largest line of photo medallions in the world. Lowest prices, quickest service. Send for catalog showing over 200 money makers. Gibson Photo Jewelry Co., Inc., 323-327 Grandview Ave., Brooklyn, N. Y.

A BUSINESS of your own—Making sparkling glass name and number plates, checkerboard signs. Big book and sample free. E. Palmer, 512, Wrentham, Ohio.

AGENTS—Engraved name plates, signs, number plates etc., easily sold with large profits. Best Bros., Waltham, Mass.

NO Dual times selling food! People must eat. Federal distributors make big money; up to \$3,000 yearly or more. No capital or experience needed; unsold goods may be returned. We furnish free sample case, license and free samples for customers—sure repeat orders. Exclusive territory. Ask now. Federal Pure Food Co., 43301 Archer, Chicago.

OUR Luminous crucifix and new luminous St. Theresa statue shine brilliantly in the dark. Sell on first demonstration. Write for prices. W. G. Hannan Co., 2543 So. State, Chicago.

BIG Money applying gold initials on automobiles. Easiest thing today. No experience needed. \$1.45 profit every \$1.50 job. Free samples. "Balco," X-1043 Washington, Boston, Mass.

NEW Line Counter Displays. Aspirin, Fluin, Chewing Laxative, Breath Gum, No-tar, Skittone, etc. Steady Repeat. Over 100% Profit. Superba Co., W5, Baltimore, Md.

AMAZING Electric water heater. Pays big profits. Heats water instantly. Pocket size. Sells fast at \$2.95. Write quick. Heater Co., 4115P, Irving Park, Chicago.

AGENTS—Clover Invention. Inkpen makes every pen a fountain pen. Fast office seller; big profits, demand increasing everywhere. Exclusive territory offered. Sample free. H. Merul Company, Tribune Bldg., New York, N. Y.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. Metallic Letter Co., 418-D North Clark, Chicago.

AGENTS Everywhere making money with our line of kitchen specialties, demanded in all homes. Big earnings possible. Write today for details. P. Reed Filter Co., 353 Broadway, New York.

LARGE Importer of neckties offers exclusive agency and entirely new proposition. Enormous demand. No competition. Unlimited possibilities. La Bonanza, 588 Broadway, New York.

AGENTS—Money coin and rubber remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 101 Seaside Bldg., Rochester, N. Y.

BIG Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 43, East Orange, N. J.

MAN in each town to place auto parts, reflectors, bathroom fixtures, reliable beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and profits. Gun Metal Co., Ave. B, Decatur, Ill.

GREATEST Opportunity; newest proposition. Build continuously paying business in your own name. Household, industrial, brushes, brooms, mops, dusters, fully guaranteed. New catalog, all net prices, no discount to buyer with. Make as high as 300 per cent and over. Write today. Wire Grip Sanitary Brush Corp., 41 East 14th St., New York.

SELL Men's neckwear—wonderful proposition. Amer-M. 29 East 23th, N. Y.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 66-T West VanBuren, Chicago.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name and address. 25c. Stamping outfits. Emblem checks, check-books, name plates. Hart Mfg. Co., Desk 2, 293 Degraw St., Brooklyn, N. Y.

HIGH-GRADE SALESMEN WANTED

KAHN \$1000 between now and Xmas. Your friends, relatives, neighbors will buy on sight. Because Process 1931 Famous Artist line of Christmas Greeting cards. Imprinted with sender's name and message, costs no more than ordinary cards. Big cash commissions paid in advance, monthly cash bonuses, etc. Write for complete outfit free and confidential sales plans. Process Corp., Dept. 802-36, 21st St. Troy, Chicago.

SELL Egg Cartons! Demand repeat side line. Everyone who sells eggs needs cartons—grocers, poultry farms, dairies. Send for information and samples. Pick up these extra commissions. Self-Locking Carton Company, 573 E. Illinois Street, Chicago, Ill.

BIG Pay giving away Shirts. Hosiery. Underwear. Also Lumber/Articles. Shipping free offers win orders. Every man buys. No experience needed. We teach you and supply complete sample equipment free. Write today. Dept. A26, Albert Shirts, 801 Sixth Ave., New York.

SCREW-HOLDING Screw Drivings! Non-magnetic. Remuco, insert screws inaccessible places! Factories, garages, electricians, carpenters, mechanics, auto, radio owners buy on sight! Free trial! Milles, 112-50 Winthrop Bldg., Boston.

ANY One Can Sell Our Carded Mice. Under your own name. All places buy. Lowest prices. \$15.00 daily. Quick Sale Products Co., Portland, Oregon.

IS Money your need? See business advertisement under "Business Opportunities."

SALESMEN—Tremendous profits demonstrating new, patented belts. Buttons into waistband. Holds trousers up! shirt down. Slenderizes, supports abdomen, back. Adjustable support for stout gentlemen. Sample, \$2.75. Perfect chaste for slender gentlemen, \$1.75. Give actual waist measure. Nationwide demand. Write YunWald Co., Lad'esse, Wisconsin.

COMPLETE line of Printing. New service. Illustrated cuts. Sample book free. Trer Printing Co., 314 - 5th Ave., So. Minneapolis, Minn.

\$50 WEEKLY Easy! Selling amazing value all wool 2 Piece Suits \$21.95, \$5 profit. Single Pants Suits. Topsuits. Overcoats \$18.95. Under tailored. Sample suit for producing, outfit free. Williams Bros., 679 Broadway, Dept. WB-22, New York.

GREAT Sideline for any salesman! Picked outfit free. New cash customer building campaign for merchants. D&H Premium Co., Dept. 538, 116 So. Wells, Chicago.

MAKE Money every day; establish agency selling men's All Wool Suits. Topsuits. Overcoats, below \$25.00. Pay you \$1.00 cash every order. Beautiful selection, easy to sell. Expense outfit, sales help free. Write experience. All Wool Clothes, Dept. 18, 800 Broadway, New York.

YES Pay You \$68 Commission every week for taking just 2 orders a day for our sensational value made-to-measure suits. Fine wools. Superb tailoring. Amazing money-making plans pay big money even to beginners. If you speak English, rush name for details sent free. W. Z. Gibson, Inc., 500 Throop, Dept. H-517, Chicago.

SALESMEN—Four \$15.00 sales to stores net you \$18.00 daily. Savers Systems, Inc., 1897, 2501-123, Sheffield, Chicago, Ill.

EVERY User of the mails needs an envelope sealer. The Kendall seals 100% better. Retail \$2.50. Big profit. Good territories available. Kendall, Dept. 4, P. O. Box 153, Berkeley, Calif.

SO Good, it's foolish to call this selling. Men must buy Shirts, Ties, Underwear, Hosiery, other necessities. Baseball's money-making year guarantees big money for you. Cash bonuses. Free shirt offer. Finest outfit free. Write today. Dept. 12, Rosecroft, 1237 Broadway, New York.

BUSINESS Stationery—Largest Line—Highest Quality—Quickest Delivery—Biggest Commissions—Liberal Bonus—Free Copyrighted Cuts Every Business—Experience unnecessary—Instructions and Outfit Free. Williams Co., Dept. 573, 2150 Gladys Ave., Chicago.

SALESMEN—Wonderful Sideline. 40% Commission paid daily. Sells all merchants. Picked outfit free. David Lionel Press, 213 So. Hamilton, Dept. 222, Chicago.

ALL Merchants buy! Se carded nuts, aspirin, etc. Steady repeats. Also low priced vending machines. Robbin Products, DeKalb and Broadway, Brooklyn, N. Y.

HAD Debt Serious Salesmen. Sell service contracts. New original plans; liberal commission; extra bonus; protected territory. National Credit Service, Columbian Bldg., Washington, D. C.

SALESMEN—At last! New feature sells punchboards everywhere. Dealers will with joy—prosperity back again. Profits enormous. Samples free. Puritan Company, 1407 Jackson Blvd., Chicago.

\$18 TO \$25 Daily; biggest selling line of men's suits. Meets present day conditions. Amazing sales at \$11.95, \$14.50, \$16.95, \$18.95. Also raincoats, slippers, uppers and boys' suits. Biggest commission paid in advance. Liberal bonus. Free outfit. State age and selling experience. "Jim" Foster, Inc., Dept. 38, 2250 South Spaulding Ave., Chicago.

WANTED County salesman with car, to demonstrate for large Ohio manufacturer. First class job. Fyr-Peter Co., 2181 Fyr-Peter Building, Dayton, Ohio.

ONE \$8.75 order daily means \$100 weekly on our guaranteed money back sales promotion deals. Free kit. Sales Stimulators, Dept. 123, 241 Madison, Chicago.

NEW And entirely different—Fast selling Se-Dee merchandise on attractive counter cards. 100% commission for you and dealers. Advertised by radio. No capital required. Catalog free. World's Products (Estab. 1921), 155 Central, Spencer, Ind.

ARE You Old at Forty? See our advertisement on page 28 of this issue. The Electro Thermal Company, 2144 Merita Ave., Cincinnati, Ohio.

SUMMER Drinks—California. Concentrates in brick form; each brick makes gallon juice; fruit cocktail, orange, lime, cherry, grape, port, cherry, champagne. Legitimate trade established in federal courts. Every home, camp, picnic ground, fair, church, hospital, and drink place, drug, grocery store prospect; 100% profit for salesman with no investment. State and county rights open. Y. & Co., Dept. 8-198, 332 S. 4th St., San Francisco, Calif.

IF You can reach inventors having patents for sale, you can represent us selling exhibiting space at the Second International Patent Exposition at Chicago, to be attended by thousands of manufacturers and patent buyers. Liberal fees to competent men. Concessions also open for Exposition lasting two weeks. 300,000 persons to attend. H. Hamilton Eklund, Manager, Merchandise Mart, Chicago.

NATIONWIDE Advertising Campaign. New model Genuine Gillette Blades pay you \$4.00 profit each for selling by mounting cut-rate advertising plan. Details postpaid 10c. Dept. 110, GCP., 609 Hamilton St., Laude.

WEN To sell Batteries with complete line of supplies to garages. Lowest prices. McKinnon Battery Co., St. Paul, Minn.

SALESMEN AND Distributors. Patented office specialty. Positive results. Exclusive territory. Markwell Fastener Co., 204 Hudson Street, New York.

SALESMEN AND Distributors—Open for; large field; extra. Send for selling plan. D.H.'s, 827 Fulton St., Brooklyn, N. Y.

SELL New patented pipe cleaner for smokers to retail tobacco stores—see ad page 18.

BIG Profit every smoker wants one on sight. Sample offer. Wm. P. Jones, 320 East Kansas, Colo. Springs, Colo.

DISTRICT Managers make money selling mystery polishing cloth. Approved by Good Housekeeping. Write for territory. Mohler, Omaha, Minn.

WE Want to hear from full and part time men who can sell complete line of business printing. One of finest in country. Thousands of live cuts. Full cooperation and progressive sales plans. Outline free. All-Trade, 110 N. 2nd St., Rockford, Ill.

NEW—Startling—amazing. \$10 to \$25 a day easily earned. Home protection \$250 to \$1000, at death. Ages 1 to 30. Not an insurance company but a society furnishing protection at cost. Write National Aid Society, Myers Building, Springfield, Ill.

NEW Specialty—Sells every business and professional man. Four \$15 sales daily pay \$200 weekly. Four cleared \$1000 in three months. Write P. E. Amusement, President, Dept. PM, Mobile, Ala.

\$75.00 WEEKLY Job—Salesmen—Distributors! Outstanding opportunity; amazing new line which guaranteed 10,000 miles. Big profits, steady repeats. Protected territory as factory distributor. Write to Economy Rubber Products Co., 603 Burkhardt, Dayton, Ohio.

PUNCHBOARD Salesmen—Most gizzmo line ever featured. Vending machines—all kinds. Make as high as \$28.00 on single order. Repeat consignments. Beautiful colored catalog free. Lion Mfg., Dept. 8, 324 W. Erie, Chicago.

NEW, Largest card catalogue, punchboards, vending machines, produces quicker orders, big commissions. Free outfit. Lincoln Sales, 116 So. Wells, Chicago. Dept. 1. Established 20 years.

\$50-\$200 A WEEK. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metalite Letter Co., 428-A North Clark, Chicago.

SALESMEN—Become independent. Own your business; experience unnecessary; selling our \$10,000 accidental death; \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited insurance department. Universal Policy, Dept. A, 715 Lefcourt Bldg., Newark, N. J.

SELL Nothing! \$170 weekly empty handed. \$500,000 purchase from announces new plan. No investment for anyone. Search starting. Hurry! K&S Sales, 4226 Ravenswood, Chicago.

BIG Profit putting our gold sign letters on store windows, without experience. Samples. Consolidated, 49-V West Van Buren, Chicago.

GENUINE Neon—Priced to sell 40% commission. Buyers want it. Willie Austin, Miami, Okla. made four calls, sold four. Collected \$80.00, three hours work. Doubt it? Write him. Every hunter hits with Neonite—the genuine Neon leader shining with changeable letters and posters. \$125 for all show windows. Also mounted Neon letters. Plug in any A.C. socket. Big money for early birds. Special 30-day demonstrator trial offer. Display Products Co., 449 East 31st, Kansas City, Missouri.

HELP WANTED

IF You want to get your groceries and household supplies at wholesale, and a wonderful chance to make \$15 cash profit a day besides, send me your name immediately. No experience necessary. Albert Mills, 9136 Monmouth, Cincinnati, O.

CASH Paid for butterflies, insects. See Special Display Advertisement on page 12.

EDUCATIONAL AND INSTRUCTION

MEN—Women, 18-50. \$105.00 to \$250.00 month. U. S. Government life jobs. Steady work. Paid vacations. Common education usually sufficient. Valuable book with list positions, sample coaching and full particulars—Free. Write immediately Today Sure, Franklin Institute, Dept. FJ, Rochester, N. Y.

WANTED, Men—Women, 18-50, qualify for steady Government jobs. Salary range, \$105-\$250 month. No Government experience required. Paid vacations. Common education. Thousands accumulated yearly. Write Current Institute, 101, St. Louis, Mo., immediately.

GOVERNMENT Mail Positions, \$140-\$225 month; qualify. Booklet free. Chisholm Service, Rockwall, Texas.

RADIO—Very latest information necessary for proper operation, maintenance and service in Modern Radio Practice Included Short Wave Receivers. New 224-page radio man's guide now available at only \$1.00. Sent postpaid upon receipt of price or C.O.D. anywhere in U. S. Popular Mechanics Press, Room 307, 204 E. Ontario St., Chicago.

LEARN How For Craft. Profitable home work. We teach it. Furnish for material. Information free. Homestead Industries, Geneva, Ohio.

LEARN Golf Club Making. Pictures and particulars free. Ralph Conrad, Aurora, Missouri.

LEARN Photo-Engraving at home by experience. We supply without extra cost all necessary equipment. Make money while learning. Aurora School of Photo-Engraving, Aurora, Missouri.

LEARN Lacquer system of sign painting. Valuable new book gives complete description of methods, materials and equipment with hints and helps for sign shops. Covers latest in electric neon tube, and daylight reflector signs, etc. Delivered to your door C. O. D. Simply pay postman \$3 and postage. Popular Mechanics Press, Room 307, 200 East Ontario St., Chicago.

LATEST And most scientific methods of dyeing and dying taught by mail. Even if new in the business this course is invaluable. We make you an expert craftsman. Good specialties always in demand. Enrollment with first two lessons \$5. Terms. American School of Dry Cleaning, Box 131, Lansing, Mich.

WE Want men and women of average school education, gifted with common sense, to study Secret Service and Scientific Crime Detection. If in this class and interested, write International Secret Service Institute, 77 River St., Heshook, N. J., Dept. 101-1.

BECOME A landscape architect. Uncredited profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 29A Plymouth Bldg., Des Moines, Iowa.

DOUBLE Entry bookkeeping 60 hours with 3 days guaranteed. (Diploma.) International Bookkeeping Inst., 8 Springfield, Mo.

DON'T Prepare for any civil service examination without seeing our catalog. Free. Columbia Correspondence College, Washington, D. C.

U. S. GOVERNMENT Wants men, \$1,700-\$1,900 and up at start. Railway mail clerk examination coming. Let our expert former government examiner prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 9, Patterson School, Rochester, N. Y.

CARTOONING—Let the world's most successful cartoonist tell you how to draw cartoons. Writers in his new book gives every step in cartoon work and answers every question a beginner might ask. Elaborately illustrated. Pay postman price of book, \$3, and small amount of postage when he delivers the package C. G. D. Popular Mechanics Press, Room 302, 204 E. Ontario St., Chicago, Ill.

SHORT STORIES

SHORT Stories revised, rewritten and marketed. Details free. Marsh Service, Box P-1013, Harrisburg, Penna.

TYPEWRITERS AND SUPPLIES

ADD-11FR Automatic Typewriter Mission Ink increases life of ribbons more than 3 times. Produces clear, uniform copy. Attachments and typewriter. Introductory \$1.75 prepaid. Guaranteed. Corning Products Company, 604 Mission Street, San Francisco, California.

TYPEWRITERS, \$1 to \$32. Ribbon, 25c. Guaranteed. Catalog free. Typewriter Exchange, Ada, Okla.

TYPEWRITERS—Motorcycles—Radios \$2.50. Best \$25.00. Terms Agents. Kalsitz, 1512 Locust, St. Louis, Mo.

TYPEWRITERS—All standard making \$10 up. Catalog free. Northwestern Typewriter Exchange, 321 N. Francisco Ave., Chicago.

ADDING MACHINES

NEW \$4.75 Automatic Adding Machine. Fully guaranteed. Bassett 1458-A, Hollywood Avenue, Chicago.

PRINTING, MULTIGRAPHING AND MIMEDOGRAPHING

1,000 LETTERHEADS Bond 650%, \$2.00 prepaid anywhere. Cash with order. Samples. Seminole Press, Miami, Florida.

PICTURES Make printing powerful. Cut rates 10c. Printcrafters, 19301, Indianapolis.

1000 BUSINESS Cards \$2.00. Underwood Press, Porter Station, Detroit, Mich.

500—8 1/2 x 11 BOND Letterheads \$1.85. Wilson, 2932 Victor, Kansas City, Mo.

QUICK—Get new low prices on high quality printing. Now's time—save real money. Hatfield Press, Gettysburg, Penna.

GET Acquainted offer—100 8 1/2 x 11 letterheads, 100 6 1/2 envelopes printed, \$1.00 prepaid. Morris Printers, Cass Bldg., Saginaw, Mich.

1,000 LETTER Heads, envelopes, statements, or business cards \$2.50. Send us samples your printing, get our low prices. Hattenstadt Printing, Terre Haute, Ind.

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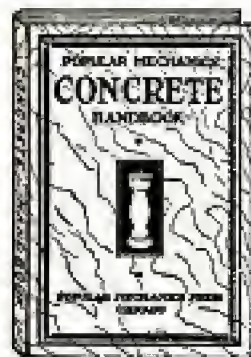
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Over the Earth and under the Water—Comparative Records Achieved by Man, Charted alongside the Epochal Ascension of Prof. Auguste Piccard

Popular Mechanics Magazine

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Vol. 56

AUGUST, 1931

No. 2

Q-1286

"Prisoners of the Air"



90 Brussels University, Brussels Belgium
Prof. Auguste Piccard, Who Soared Higher than Man Ever Before Attained, behind the Barred Porthole of His Aluminum Sphere, Examining One of His Instruments

TWO men hitched their chariot to a star and figuratively raised the roof off the world—an adventure, an epic, a chapter in history.

Prof. Auguste Piccard and his assistant, Charles Kipfer, have come down from their ten-mile ceiling after the most astonishing feat of roof-raising in human history.

Piccard's flight carried him to 52,462 feet. It was mainly an effort to study cosmic rays at an altitude where they would not be cut off by the earth's atmosphere. In preparation for the flight, the

"CH-113" was only partly filled with hydrogen, as it was feared that at 50,000 feet, the expansion of the gas would burst the balloon envelope. Tests revealed that human beings can survive half the ordinary atmospheric pressure comfortably if they do not move. This pressure corresponds to an altitude of about 16,000 feet. Above 7,000 to 8,000 feet, man must have artificial respiration. From 30,000 to 40,000 feet, human energy ebbs to its lowest, even with the assistance of oxygen tanks.

These considerations forced Piccard to

*see also Nov. 1932 693
Oct. 1932 528*



hydrogen was admitted. Even so, the "CH-113" stood 150 feet above the ground, like an inverted yellow pear. The gondola hung from the base, relatively toylike in size. One hemisphere was black, the other white, for it was Piccard's theory that he could heat up the interior by turning the black side toward the sun, and cool it off by doing the opposite. The balloonists wore large straw hats lined with pillows, to protect their heads if knocked against the metal gondola.

Before dawn on May 27, the lashings were cut and the "CH-113" bounded into the pale sky like a rubber ball. Soon the red disk of the sun, far below the earth's rim, was speeding up to meet them. The altimeter needle showed an amazing rate of speed. Twenty-five minutes after the take-off they were near 50,000 feet! A blanket of mist obscured the earth. The temperature inside the gondola frequently reached 106 degrees Fahrenheit, while simultaneously the outside temperature fell as low as seventy-six degrees below zero.

Piccard found that the gases generated by cosmic rays increase their conductivity at high altitudes. After reaching the ceiling, he also discovered that the balloon valve was out of order, preventing a descent, and he wrote in his log a line

devise an airtight gondola. Hermetically sealed and supplied with tanked oxygen, such a cabin is perfectly safe; but if it leaks, at once it becomes a death chamber. The spherical cabin was built of an aluminum-tin alloy. Every seam was handwrought and welded. The balloonists moved in a spherical space seven feet in diameter. Two filters, each with a capacity of eight hours, were employed to remove exhaled carbon dioxide. That simple equipment saved their lives, for while they intended to remain aloft only six hours, they actually stayed up seventeen hours. Although the bag had a capacity of 500,000 cubic feet, not nearly that much



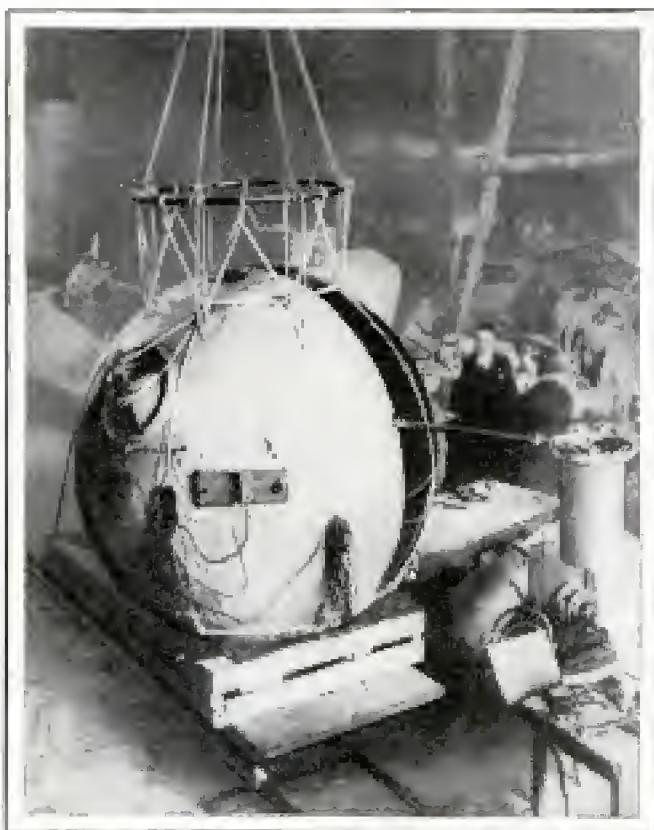
The Balloon That Went to the "Top of the Universe," and, Below, the End of the Journey, on a Glacier



Valve of the Balloon, the Failure of Which Caused the Scientists Successfully to Rise Higher than They Intended



Basket Hat Worn to Prevent Injury in Sudden Drops; at Left, Preparing the Metal Sphere for the Trip; Below, Doctor Piccard Looks Over His Equipment in the Gondola Before the Take-Off



describing the situation: "Prisoners of the air!"

By the end of the afternoon, the balloon had floated over the Alps, and the voyagers eagerly anticipated the setting sun, because the condensing balloon

gas would force a descent. As the sun began to sink, the "CH-113" pursued it.

When the outside pressure equaled that inside, they opened the scuttles and pre-

A-1286



Kipfer Examines Valve Which Allowed Air to Enter and Leave the Gondola, Preventing Differences in Pressure from Causing Damage

pared to land, finally coming down on a glacier.

"The trip proved," said Piccard, "that the stratosphere is navigable, and that man will be able to master this region of cold. Our flight was a series of indescribable sensations. At our ceiling the sky was a dark deep blue, but no stars were to be seen."

Piccard does not confirm the theory that the prevailing wind in the stratosphere blows contrary to the direction of the earth's rotation. "That's all bosh," he says.

Dr. W. J. Humphreys, of the U. S. weather bureau, says that the safe return of Piccard indicates that passengers could live in rocket-propelled planes traveling in the stratosphere, provided the passengers could withstand the enormous velocity at which such conveyances would travel.

"If Piccard and Kipfer reached 52,000 feet," continues Humphreys, "they were more than two-thirds as high as it is possible for a balloon to go with passengers. A balloon carrying human beings cannot possibly rise more than 75,000 feet, or about fourteen miles, because at that height the atmosphere loses their

lifting power. Small balloons carrying instruments have reached as high as 100,000 feet, and a pilot balloon is said to have gone 120,000 feet. Withal, the extent of the earth's atmosphere is still problematical."

The aurora borealis rises to 300 to 400 miles, and this may indicate that a thin atmosphere exists at that altitude.

SEEK BEST WOOD PRESERVATIVE BY TESTS

A-1209

To combat the destructive agencies that cause damage to frame buildings, the British department of scientific research is conducting hundreds of tests with

wood preservatives in the hope that one may be found that will make the frame house of the future virtually indestructible as far as the weather is concerned. The test field looks like a cemetery, for the wood posts under test are set upright in the ground, each specimen of wood being treated differently. Careful record is kept of the life of each post.

Buckinghamshire, Eng.



Posts Treated with Different Forms of Wood Preservative in Test to Find Best Kind

Chas. L. Paul
No. 1409, 537 S. Dearborn
Chicago
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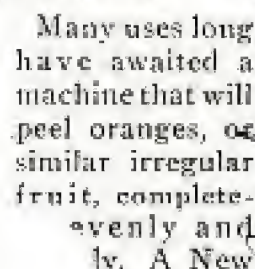
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Lead Shield and Carrier Employed to Safeguard Those Handling Radium, and Patient Receiving Treatment

distant spaces might not be the same as that from our nearer neighbors, that it might become "tired" on its long journey and not travel so speedily. He measured its speed, however, and found it to tally exactly with measurements conducted on earth. Thus, these aged light beams have lost none of their youthful fire, although they have speeded along at the rate of 186,000 miles a second for countless eons. The tests were made to find whether the universe is exploding.

Q-1143



hospital has installed one, which peels both inner and outer skin from any orange regard-

of skin or shape.
mer fruit and no
automatic in action
than 500 oranges

A. 1309

James J. Cleary
Syracuse, N.Y.

by an hour
~~under~~
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will handle more than 500 oranges
our.
James J. Cleary
Syracuse, N.Y.
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Combs Fruit Machinery Co
441 W. 4th St
Chicago, Ill



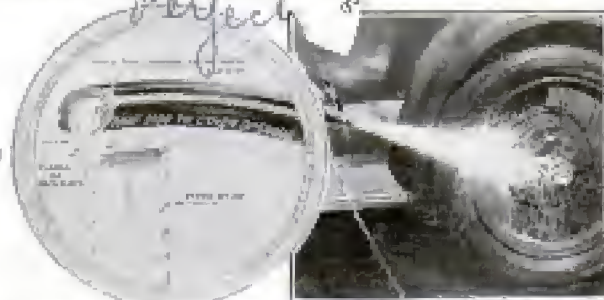
Radio Set Developed by the Signal Corps for Use by Cavalry; the Pole Held by the Rider Acts as the Aerial

HORSEBACK RADIO RECEIVER KEEPS CAVALRY IN TOUCH

Developed by the signal corps, a portable radio that operates on the back of a horse on the march has been adopted by America's cavalry forces. The apparatus is mounted behind the cavalryman's saddle, and a pole aerial is carried by the rider. The set was found satisfactory in recent mountain and desert maneuvers.

BRAKE SHIELDS STOP SCREAMS BY KEEPING OUT GRIT

To remedy screaming and grinding internal automobile tires, a rubber-manufacturing company has placed shields on



Brake Shield Protects Lining from Water and Sand, Thus Preventing Noise and Wear

the market, which make the brakes water and weatherproof. The shields can be installed in less than half an hour, withstand oil and grease, and prevent frozen, slipping or dragging brakes and scored drums, caused by grit entering between the shoe or lining and the drum. Longer-lasting lining also is claimed, inasmuch as grit entering one drum will chew the lining so badly that all brakes, though some of them may be only partly worn, must be relined to make them uniform.

A-13A

SPEED CHAMPIONS BUILT TO REACH STRATOSPHERE

Airplanes intended to fly at altitudes of more than six miles, where they can reach much

higher speeds, are being constructed in Germany. One such ship has been built and will try to find paths in the stratosphere that can be employed as regular airplane trade routes. The mysterious guns of the German army, bombarding Paris from a distance of seventy-five miles, were the first practical application of the decidedly lower resistance of the upper atmosphere, of which aircraft now are preparing to take advantage. The stratosphere plane is not built for high speed or long flights, but it is expected that high speed can be attained at such a height, due partly to a calm atmosphere and lowered air resistance. The first craft is a Junkers metal deep-deck single-motored machine with a wing span of sixty feet, and weighs 9,000 pounds. A small compressor keeps air pressure normal inside the cabin which is double-walled and airtight. Control of the motor and steering is accomplished by levers in the cabin, working in airtight shafts, and the motor has a pump to supply sufficient air for the engine in the rare atmosphere six miles up. The necessary scientific instruments form the equipment of the craft.

General Tire & Rubber Co.
Akron, Ohio

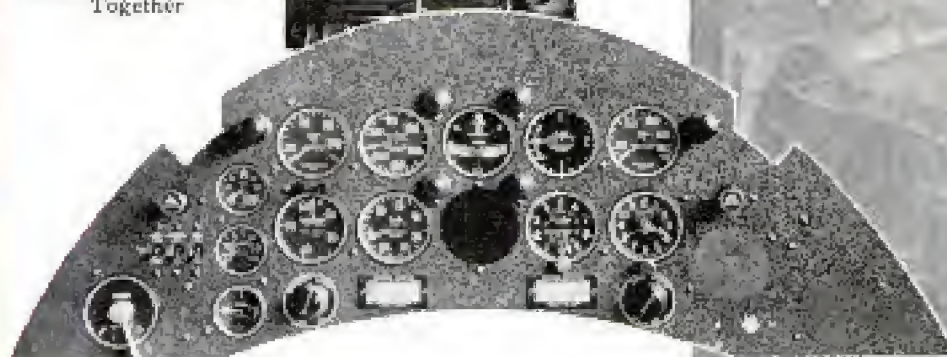
Built by
Junkerswerke
- Dessau Germany

Science Service 531.C 5/27/31

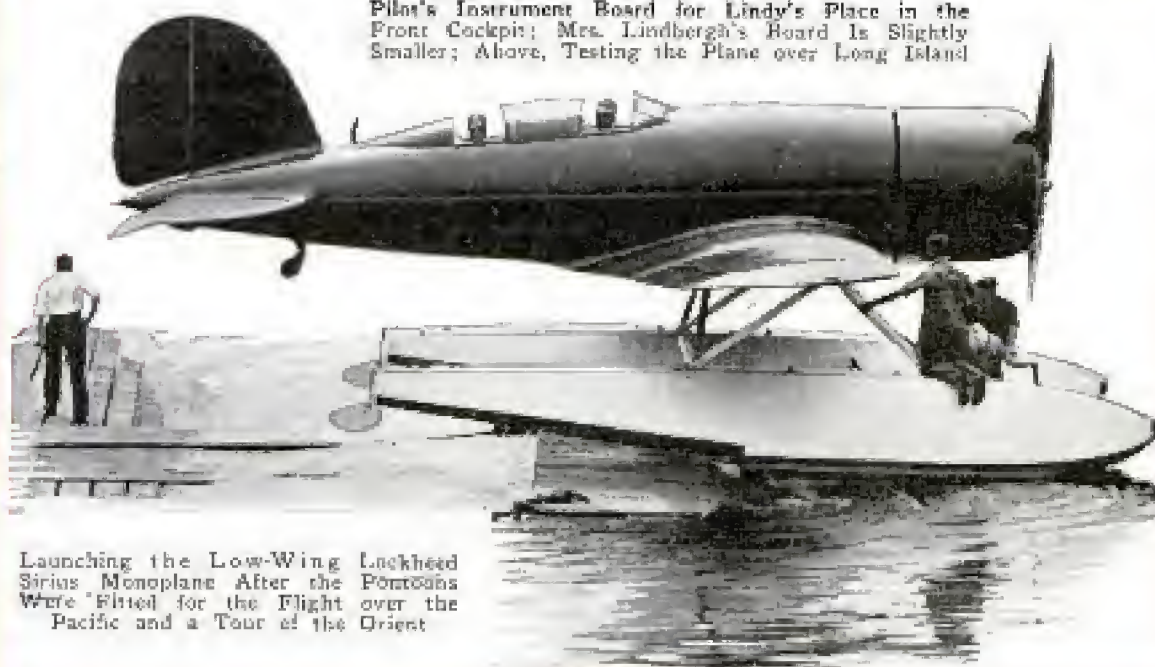
"WE THREE" GETTING READY TO HOP PACIFIC



Col. and Mrs. Charles A. Lindbergh as They Prepared for "Tour" Together



Pilot's Instrument Board for Lindy's Place in the Front Cockpit; Mrs. Lindbergh's Board Is Slightly Smaller; Above, Testing the Plane over Long Island



Launching the Low-Wing Lockheed Sirius Monoplane After the Pontoon Were Fitted for the Flight over the Pacific and a Tour of the Orient

91-5-22

ELECTRIC MAP PREDICTS THE COMING WEATHER



Electric Weather Map for Aviators Which Shows by Means of Colored Lights Flying Conditions to Be Encountered in Any Area

To meet the exacting requirements of modern aviation for up-to-the-minute weather data on flying conditions, the navy has made an electric weather map for its pilots which, at any minute of the day, gives the latest information as to conditions existing along any projected route where data are available. With this map, located in the pilots' room at the naval air station Anacostia, the flyer can tell at a glance not only the general character of the weather along the route, but also the nature of unfavorable conditions in specific areas through which he may pass. The map is operated from a control panel in the office of the station aerologist, where weather reports are being received constantly by radio, telephone and telegraph. Changes are indicated on the map by throwing a switch on the control board. The type of weather in any area is shown by white, green and red lights. If the white light is burning, the flying weather is excellent, good or average. Green indicates undesirable, and red means bad flying conditions. If the white light is burning over his route, the pilot has nothing to worry about, but if green or red is showing, he finds what undesirable condition prevails by referring to a zone panel at the side of the map which shows the cause of the bad weather by a

light burning on the side panel under the proper zone heading. The side panel also shows the velocity of the wind at an average flying altitude of 3,000 feet for each zone.

BABY CARRIAGE FINDS A PLACE IN MUSEUM

For the first time a baby carriage has been placed in the collection of vehicles of transport at the Smithsonian Institution. For some reason no one ever thought of including a perambulator until one of them, bought in 1863, was donated to the institution. The carriage differs from the modern four-wheel perambulator. It looks like a miniature one-horse-shay, has two wheels and is pulled by a long handle.

by Miss Julia Rice, U.S. Navy

SIGN PORTRAYING OPEN DOORS OFFERS WELCOME TO CITY

Tourists entering the town of Plymouth, Mass., where the Pilgrim forefathers landed, are greeted by a large, flat signboard painted to give the impression of a pair of doors. The signboard extends a welcome to the thousands of visitors who travel to Plymouth annually and is the work of a local artist.



Sign, Showing a Pair of Opened Doors, Which Welcomes Visitors to Plymouth, Massachusetts

Cont. Thomas H. Withkorn
5133 S. Price
P. 1014

Cont. J. D. Hancock, Bureau of Aeronautics, Navy Dept., Washington

Study 6/11/31

no cinematograph

highlighted material



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Rescue Ship Built to Aid Airplanes That Fall in Open Water; Where Towing Is Impossible, the Salvaged Plane Can Be Raised to the Deck at the Stern and Brought to Land

yield brought up by three companies operating the field is averaging twenty-one-hundredths of a karat, about \$5.67 worth of rough diamond for each thirty-six cubic feet of earth. The prize find in the field weighed slightly over forty karats.

For the rescue of airplanes that fall or stall on open water, the war department now has a special emergency ship built to make possible the speedy arrival of a competent means of help. The vessel, welded throughout, is equipped with a winch for retrieving wrecked planes, and where towing is impossible, the salvaged ship can be anchored on a deck at the stern of the boat.

DIAMONDS MINED IN ARKANSAS
JUST LIKE AT KIMBERLEY

Toiling away along a dry little gully in Arkansas, called "Poor House Branch," workmen with picks, shovels, plows and scrapers are bringing forth diamonds in what geologists declare is the only matrix in the United States that bears the precious stones, and the only counterpart in the world, so far as is known, of the famous South African field. During the time this seventy-three-acre tract has been mined, it is estimated 25,000 ranking diamonds have been discovered, and the matrix is far from being exhausted. The

Pike County

**SOLDER THAT FIXES "ANYTHING"
SETS WITHOUT HEAT**

Liquid solder that, it is claimed, "hardens like rock and holds like iron," has been placed on the market for the repair



of broken furniture, crockery, porcelain, tile, tool and implement handles, cracked cylinder blocks, leaky radiators, gasoline tanks, such as shown in the photo, automobile tops, upholstery, luggage, tents, awnings, toys, miniature

aircraft, spectacle frames, broken shoe heels, golf clubs, glass, and the like.

tees, golf clubs, glass, and the
Polox Mfg Co

Mr. [Name]

Inquire from Indian River the

Chinatown
Polo Inst. 9/10
623 Blingsey Parkway
New York 22, N.Y.
12-7

H. C. White Co.

Kansas City
Star 6/14/31

186

118 North Dennington, Ok. POPULAR MECHANICS



Toy "Steam" Shovel Which Performs Like a Big One under the Guidance of a Juvenile Engineer

TOY "STEAM" SHOVEL HELPS YOUTHFUL BUILDERS

Back-yard sand piles become scenes of major engineering projects when a toy "steam" shovel is added to the spades and pails. For with the miniature, muscle-driven steam shovel a boy of six can perform all the fascinating operations of the man who handles a big high-powered digger. The toy is so strongly built that it will not only work in dirt, sand and gravel but will stand up under the hard treatment of juvenile engineers. With a bar the operator swings his apparatus right or left, and two levers control the action of the shovel as it digs, extends and dumps its load.

"ROCKET MOTOR" FOR AIRCRAFT PERMITS HIGHER FLYING

Embracing rocket, turbine and propeller forms of power, an airplane engine of revolutionary type has been produced. The high-speed gases from the rockets are directed against blades of a turbine.

to the shaft of which is connected the airplane propeller. In extremely rarefied atmosphere, where the propeller has so little pulling power as to be practically useless, the direct blast of gas from the rockets themselves drives the plane. In altitudes that now are considered high, where in the propeller's power is diminished but not entirely exhausted, the engine allows part of the gases to blow directly into

the air for propulsion and part to turn the turbine, so that both means of power are made available.

RUBBER GLOVES IN THE MAKING OFFER UNUSUAL PICTURE

Ordinary objects often give startling effects when viewed through the eye of the camera. When a photographer invaded a rubber-glove factory and took a picture of some of these gloves on the way to the vulcanizing department, he obtained a photograph that might easily be mistaken for the skyscrapers of some future metropolis instead of a gnat's-eye view of a few rubber fingers. Forms made of wood or porcelain are dipped in the rubber solution and dried repeatedly until the right thickness is obtained; then the gloves are vulcanized.



Not an Aerial View of City Skyscrapers, but Rubber Gloves on Way to Be Vulcanized

in Germany

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American Furniture Mart
666 Lake Shore Drive
200.54 are youngsters

Prof. Robert H. Goddard,
Clark University,
Worcester Mass

U-1206
Capt. Ben Ames, (Sheridan
Square, New York)

The World's Most Amazing Yacht Puts to Sea

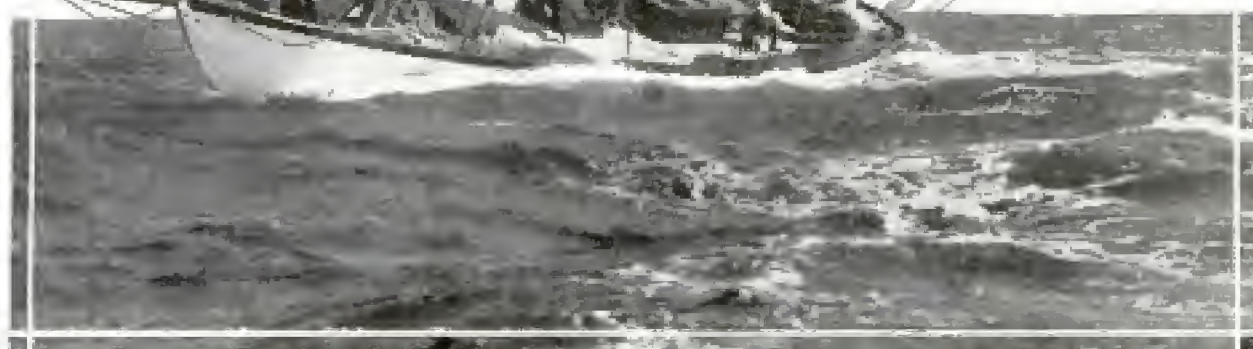
ALMOST 300 years ago the "Mayflower" sailed from Plymouth to America. This summer a fleet of a dozen or more English and American yachts sailed on a long race from Newport to Plymouth.

But how different these yachts were! Limited in length between forty-five and seventy-two feet, they resembled her only in that they depended on the same winds.

One of the most interesting of these yachts is the ketch "Landfall." Secretly built in Germany, she is a marvel of design, and is fitted out with the latest and most ingenious devices known to the nautical world.

"Landfall's" oval main mast is hollow and composed of thirty-six lengths of wood, fitted and laminated to obtain lightness and strength. She carries twenty-six different sails—12,000 square feet of canvas. She has a huge spare mainsail that converts her into a cutter; jibs and staysails that overlap half the vessel; heavy storm canvas; sails for every condition of weather that might be met.

Rigging and hal-yards are of stainless steel, and on her deck are winches that do the work of ten men.



The World's Most Ingenious Yacht, the "Landfall"; Secretly Built, She Is Equipped with the Latest and Most Unusual of Nautical Facilities

Owner. Paul Hammond

187



setting sheets and halyards. She has three separate steering systems for safety.

But for all her innovations on deck, it is down below that the old-fashioned sailor would be astounded. At the foot of the companionway, the navigator's room resembles the control compartment of a submarine. Dials, gauges, and gadgets are everywhere. There is a French instrument which records the speed through a sensitive, flexible blade protruding through the side of the boat. Another dial records the force of the wind. Still another records its direction. The three chronometers, ticking away in their compartment, are checked by radio.

Because, in a small vessel in rough weather, it is often necessary to batten down all hatches for long periods, the ventilating system on the "Landfall" has been carefully worked out. A new type of port keeps out the water, while fresh air can circulate in the worst weather, and electric blowers dispel the stale air.

The oversize galley range burns coal or gas, the gas being carried under pressure in large tanks. Open-faced stoves are provided, giving the effect of fireplaces.



Photo by Edwin Lasker

Above, the Hull of the "Landfall"; Middle, the Radio Control Room; Below Is the Luxurious Cabin; Note the "Fireplace" Stove, of Which There Are Two

HUMAN PENDULUM YANKED FROM PLANE IN AIR



While the entire personnel at Chanute field watched spell-bound and horrified, the oldest of human dramas, risking of lives to save another's, was re-enacted in a new setting—the clouds. Private

Harold E. Osborne, a student in the parachute riggers' school at Chanute, was scheduled to make a test leap. He climbed out of the cockpit, thousands of feet in the air, and by accident released his parachute rip cord before he could jump. The chute caught in the tail assembly of the plane, yanked Osborne into the air and left him there, stranded and swaying like a pendulum in the slip stream of the plane. Although the strain of the soldier's weight was terrific, the pilot, Lieut. C. H. Deerwester, managed to maintain his altitude and control, while another plane, piloted by Lieut. H. E. Engler and car-

Courtesy, U. S. Army Air Corps

Private H. E. Osborne Who Took the "Longest Parachute Ride" When His Shroud Lines Became Entangled with the Plane's Tail

rying Lieut. A. A. Straubel as a passenger, took off to attempt a rescue. The second plane, with "Follow Me" chalked on its side, headed out over a near-by lake, followed by Deerwester and his dangling

human pendulum. When over the lake, Lieutenant Straubel lowered a knife on the end of a weighted rope, to the unfortunate soldier, the planes meanwhile being held in as near the same relative positions as possible. Osborne finally caught the knife, cut the shroud lines of his entangled chute, dropped like a plummet, and then pulled the cord of his reserve equipment and floated safely down from the "longest parachute ride in history."

☛The blood of fish and turtles contains nearly three times as much phosphorus as that of the higher mammals.

a-1061
190

FLOATING AMBULANCE ALWAYS READY TO SERVE



Floating Ambulance Which Meets Incoming Ships and Removes Sick Passengers

In order to prevent the spread of ship-borne diseases, a floating ambulance has been put into service on the Thames river at London. Vessels arriving with contagious disease among passengers or crew are stopped before docking and the invalids removed to the ambulance boat. Patients are

taken to a hospital for treatment before being allowed to come into contact with London's dense population. The ambulance boat is on duty twenty-four hours a day, with three shifts of specially trained men ready to meet emergencies at any time.



acme

SECRETS OF THE STRADIVARIUS REVEALED BY PHOTOS

Photographs of the sound waves from a Stradivarius have proved the reputation of violins made by this master for quality of tone to be fully justified. A striking power is revealed by pictures of the sound waves of the Stradivarius in contrast to other violins. The secret of the tone quality of the instruments made by the Italian craftsman, in the opinion of Dr. William Braid White, acoustic expert, who made the pictures, lies mostly in greater simplicity and symmetry of its fundamental vibrations. He recorded the physical properties of tones from each string of such an instrument, made in 1714 and valued at \$60,000. For the powerful "open" tone drawn from the G-string, a line was traced resembling a series of low, almost perfectly formed waves. When other strings were sound-

ed, the waves became more jagged vertically, but none the less symmetrical.

SOLDERING-IRON HEAT CONTROL KEEPS TOOL JUST RIGHT

Thermostatic heat control that keeps the soldering iron at just the right temperature, has been made available with a product that combines these faculties with a rest for the iron. The control is connected between the iron and the current source. The tip of the iron, when too



hot, closes a thermostat which reduces the voltage and cools the iron.

*American Steel
S. F. Ware Co.
S. F. Sales Chicago*

*Supreme Electric
Products Corp.
Clinton Av. S. Rochester N.Y.*

a-1254
N.Y. Times 6/10/31

2259.

and Miller H. Fitch.

MONORAIL FLYER TO PUT THRILL IN TRAVEL

Monorail connections that will make possible speeds of 150 miles per hour between cities, and materially reduce traveling costs, will be in operation in America soon, according to plans now being formed. Engineers of the Pennsylvania railroad, the Westinghouse Electric and Manufacturing company, and the president of Queens, N. Y., have designed a monorail system, patterned after the Langen line in Germany, and the Pennsylvania has offered to turn over its right of way between College Point, L. I., and Whitestone for the first installation. In the American design the cars are suspended from rails running between T-shaped towers. The bottom of the car will be fifteen feet or more above the street level. Stations will be similar to elevated types, but the climb will be shorter for passengers. The cars will be streamlined for speed and will be driven electrically. They will be about the same size and capacity as those used in subways.



Type of Monorail Flyer Planned for the Pennsylvania Line, Providing Thrills of Air Travel with Capacity of a Passenger Train

stock can be handled. One of the tools is for straight-line work, while the other, with curved and pointed blades, will cut circles and other curved shapes.

ELECTRIC EYES MIX CONCRETE IN PROPER PROPORTIONS

One concrete mixer has an automatic control system operated by photo-electric cells that can be depended on to measure out the different ingredients with unfailing precision and dispatch. These cells are built into dial scales in such a way that the pointer of each scale swings between an associate cell and its exciting lamp. Each ingredient is brought to the mixing plant by conveyors that feed into weight hoppers. The charging goes on until the pointers pass through beams of light focused on the electric eyes, when sensitive relays stop the flow. With the eyes on watch, concrete of a uniform grade can be produced regardless of the number of batches made up.

TIN SHEARS MADE LIKE PLIERS SPEED UP SMALL WORK

Made on the same principle as pliers, which they resemble, two types of sheet-metal snips have been introduced for smaller varieties of work. The cutters are of tool steel, so that even heavy, tempered



Using Curved-Nose Plier-Shears to Speed Up Small Sheet-Metal Work

Cond. Elv. Belknap May 11
55 W. 86 St. N.Y.
New York

475-5358 High

R. W. Shury
Hardware & Supply Co.
Albion, Ohio

Stephens-Adams Co.
210 Ridge Ave. Aurora, Ill.

Chicago agent - Henry
Es. Klein, 4014 N. Mayfair Ave



Long-Handled Grass Clipper for Trimming along Walks; It Can Be Operated with One Hand

LONG-HANDLED GRASS CLIPPER DOES AWAY WITH STOOPING

Stooping is eliminated and grass trimming along walks and under shrubbery is speeded up with a long-handled grass shears that is operated with one hand. The clipper is supported by wheels which keep the shears at a uniform height, and the operator walks at a natural pace, doing the clipping by pressing on the grip handle which is mounted on a tubular shaft and connected to a rod that actuates the blades.

ENGINEERS' MYTH COMES TRUE IN GASOLINE TURBINE

Almost an engineering myth like perpetual motion, so difficult has been its road to completion, an internal-combustion turbine has been produced. A French engineer is the builder of the motor, and he has operated it as long as five hours continuously without overheating. The combustion chamber is essentially two cones, each grooved in a helical manner, with the grooves widening at the outer end. Air is taken in through a similar set of cones, but with the helical grooves

spreading in the opposite direction. Gasoline is used as the starting fuel. When the motor is revolved with a crank, the air is brought into the combustion chamber, where it heats and expands. As it expands, it tends to push apart the spirals of the two cone-shaped members, causing one to revolve, and finally is exhausted at ordinary pressure, therefore without noise. The first engine weighs 150 pounds, develops fifty horsepower, operates at 2,000 degrees Fahrenheit, and is only thirty-two inches long and fourteen inches wide and high. It is a true turbine, having no pistons, crankshaft, connecting rods or valves. Overheating of the cones is prevented by placing surfaces of fused sand on the spiral grooves.

HISTORIC SHIP STANDS ON END BEFORE PLUNGE TO BOTTOM

After more than forty years at sea during which she made 576 voyages and traveled more than 4,000,000 miles, the Australian steamer "Wodonga" was sunk recently off Sydney Heads, Australia. The finish of the vessel was dramatic, for she reared on end before the final plunge, giving an opportunity for an unusual picture of the death throes of a big ship.

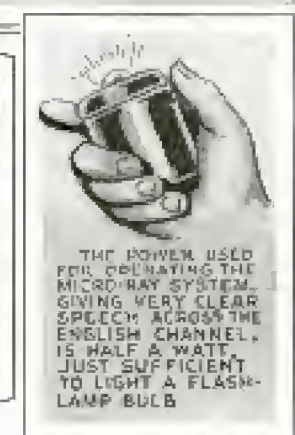
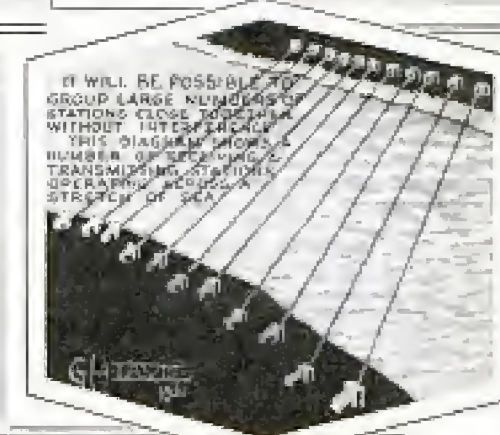
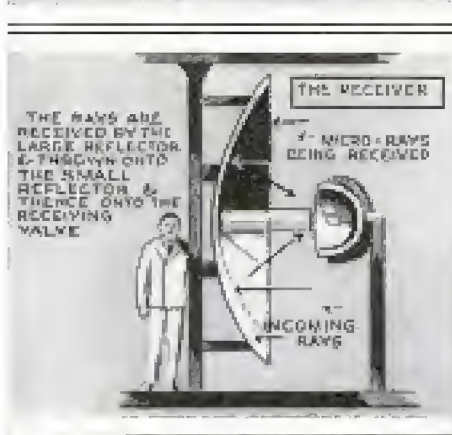
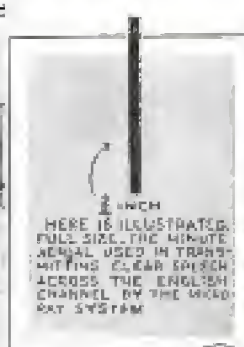


Dramatic Plunge of an Australian Steamer, Which Was Sunk After Traveling 4,000,000 Miles

Aeronautical Engineering for the Aeroplane
May 27, 1931
175 Becardally

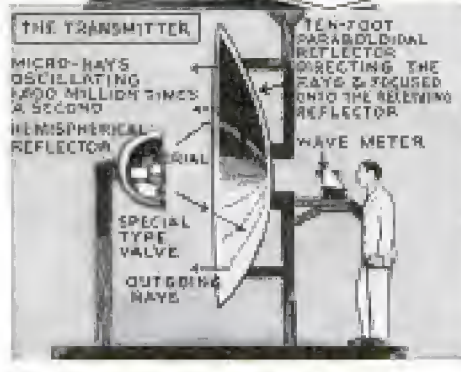
M. Isabriel Bertin
and others

NO MAN'S LAND OF RADIO OPENED BY MICRO-RAY



Courtesy The Illustrated London News.

Radio fans of the future may pick and choose from a quarter of a million stations if full advantage is taken of the opportunities that recent experiments indicate are offered by the micro-rays, the ultra-short radio waves ranging in length from ten to 100 centimeters. Using aerials less than an inch long and one-half watt of power—just enough to light a flashlamp bulb—a two-way radiophone conversation was conducted across the English channel on the micro-rays, and from this demonstration has come the prediction that the extremely short waves offer room for 250,000 transmitters which can operate without any interference with each other. After the long waves, great power and lofty aerials of today, such a Lilliputian system would seem almost impossible for practical purposes, but the secret lies in the receiving and transmitting arrangement. Reflectors, about ten feet in diameter, are used at each end.

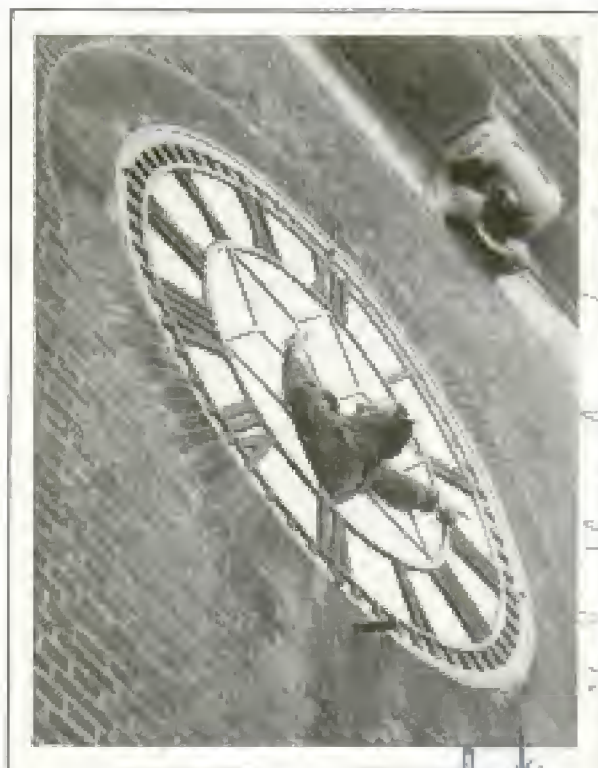


How Micro-Ray Receiver and Transmitter Operate, and Comparison of Small Power and Equipment Needed with That of Ordinary Station

In front of the transmitting reflector is another small hemispherical one with a special tube. The micro-ray, oscillating 1,600,000,000 times a second, is sent from the small to the large reflector, the latter being focused on the receiving reflector. The receiving reflector throws the waves onto a smaller one facing it, from which they travel to the receiving tube.

Instead of fighting for space in the narrow bands now available, radio stations, by utilizing the micro-rays, may be able to select their own band with no fear of ether congestion for years to come and without danger of interference from any other station. Television, which requires considerable room on the air, also may benefit from the micro-rays, since they will make available so much additional space. The rays are unaffected by climatic conditions, so that they may be useful in extending the value of light-houses, aiding communication between ships and assisting aerial navigation.

set. July 1931 International Telephone & Telegraph Laboratories
P. 114



Clock with Human Hands: This Man Substituted for Regular Hands While Timepiece Was Repaired

HUMAN HANDS ON CLOCK TELL THE EXACT TIME

Human hands for a while pointed out the time recently on the face of a big town-hall clock in Colchester, England. The two regular hands were lost and a man consented to use his own two hands as a makeshift so the townspeople could tell the time while the old clock was given a spring cleaning and provided with a pair of new hands.

SHEEP GIVEN TOBACCO AS CURE FOR INTERNAL PARASITES

Tobacco, mixed with salt, has become an approved addition to the diet of sheep afflicted with internal parasites. The Canadian department of agriculture has announced that a paste made of ten parts of salt to one of crushed tobacco is palatable to sheep and has a curative effect on such troubles. In making the "tobacco lick," leaf tobacco is crushed to about the size of wheat bran and mixed with slightly moistened salt.

Mulberry trees are being planted in Mexico in the hope that a silk industry may be established there.

DECAY OF FOODSTUFFS HALTED BY SHORT RADIO WAVES

Checking of decay in food materials through treatment with ultra-short radio waves has been reported to the department of agriculture from Holland. After the short-wave machine has been operated about ten days, a field of influence is found about twenty meters in all directions from its set-up, in which no organic matter can decompose. The field permeates everything within its radius, including stone walls, lead, iron, wood, and glass, works indoors or outdoors, and in any atmosphere or temperature.

LUMBER PILER BUILDS A STACK THIRTY-EIGHT FEET HIGH

Capable of handling 10,000 feet of lumber an hour, a piling machine eliminates the need of conveying lumber long distances, saves storage space and reduces loss from stained lumber. With the piler, the lumber can be stacked twice as high as by hand methods, one such machine building a stack thirty-eight feet high.



Lumber-Piling Machine Which Is Capable of Building a Stack Thirty-Eight Feet High

The Johnson Lumber Co.
Box 1000
Seattle, Wash.
Are and ready to supply material

Carl James Montague
608 Harbor City Bldg
San Francisco, Cal.

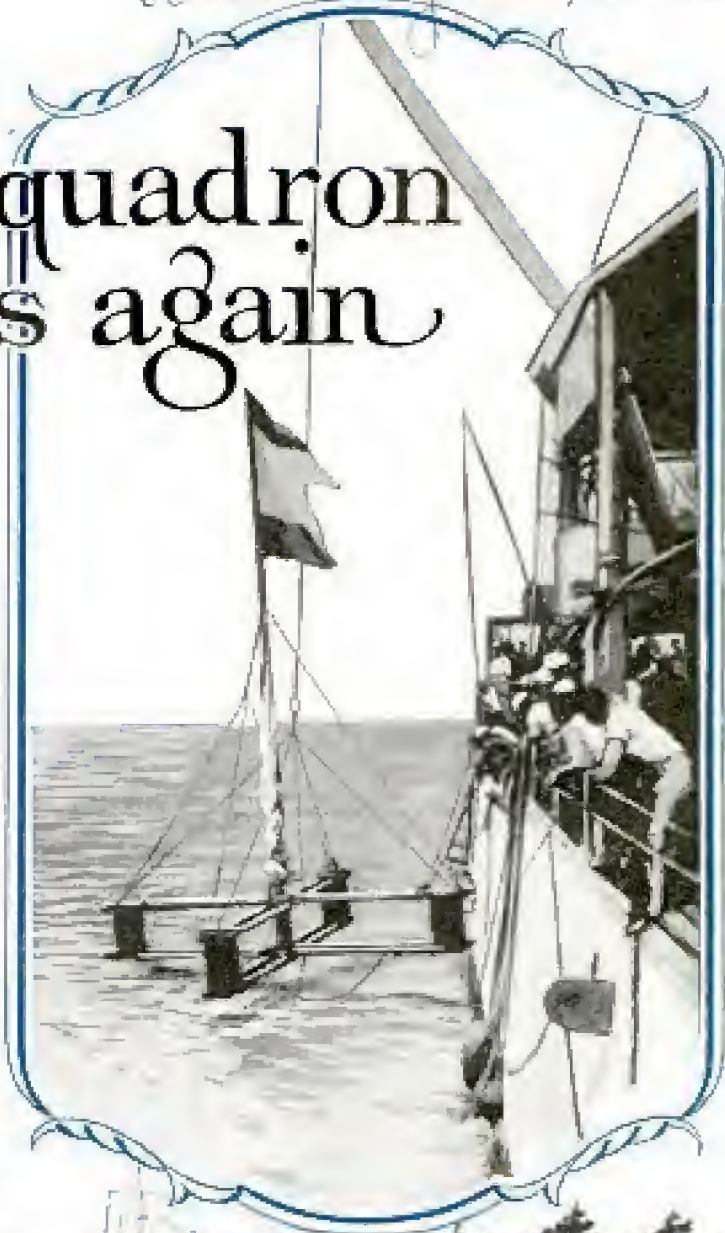
A-1095 Cont. John Warren Woodley
2554. 29th St NW
Washington, D C

The White Squadron Sails again

BACK in 1907 when the American fleet went around the world, the navy had white ships. Long since, however, our fighting craft have been painted a business-like gray.

But there is in the navy today a group of white ships, and once more they have steamed out of the blue Caribbean after a season's work along the Spanish Main. They are the three survey vessels led by the veteran "Hannibal."

Attached to this white squadron and preceding it homeward this spring by a few hours were two silver-white amphibian planes. They had air-mapped Porto Rico, assisted the "Hannibal" in charting the shores of Venezuela, reconnoitered for another naval survey ship off Panama, then had returned to the United States along the jungle shores of eastern Cen-



Above, Putting Overboard a Flag Marker to Be Anchored to Define Corner Boundary of Area to Be Surveyed; Below, Former Submarine Chaser Towing a Flag Marker into Position

Q-1095
196



Above, Motor Launch with Special Platform for Making Soundings with Lead



Above, Running a Line; Below, One of Two Towers Used as Key Positions from Which to Run Survey Lines



Above, Air Photographs of Porto Rico Taken by Naval Planes and Pieced Together to Form a Mosaic; the Photographs Are Systematically Taken to Overlap



tral America. The white ships have gone to their home yards, where they will be overhauled for the tasks allotted to them next season. Commencing in the fall, this small but significant fleet, again aided by planes, will resume in the Caribbean its harbor and coastal charting.

As a part of this duty, they will drag with buoyed wires for pinnacles which have been reported extending dangerously upward from the ocean's bed; take lead and sonic soundings of sandy banks, believed shallow and therefore forcing vessels from their direct courses between

ports; continue tidal observations, and further photograph from the air regions of which geographical knowledge still is inexact.

Their season's work in the Caribbean will average, as in the past, about 1,200 miles of coastal survey, 1,000 square miles of soundings and 2,500 square miles of mosaic air-mapping. The data compiled by the white squadron will be transferred to engraved charts, coast pilots, air pilots and sailing directions, which will continue to be issued to the entire seagoing world so that this great cross-

a-1116. Carl Thackwell
4649 Beverly
Blvd. 197
Los Angeles, Calif.

road of the Americas may be safer for all. This fall the "Hannibal" will survey the approaches to the Nicaragua canal.

This work follows a definite plan of surveying coasts of countries which do not maintain adequate facilities to accomplish such accurate mapping and which have invited the United States to undertake the mission. In accordance with such requests, the navy has charted areas the world over since 1837: Japan, Brazil, the Arctic, Mexico, the Mediterranean, Siam, the Antarctic, the Pacific archipelago—just to mention some spots on the globe.

While on the survey, work for all hands continues from early daylight until dark. Surveying is hard, grueling labor, but it has its full share of adventure and thrill. The personnel become highly skilled in astronomically exact plotting and in the handling of small boats in strong winds and heavy seas. Because of this experience, and for the reason it often takes them into strange and interesting localities, service in the navy's white squadron is popular both with officers and men.

"BIRDS" ON PHONE LINES AID LONG-DISTANCE TALKS

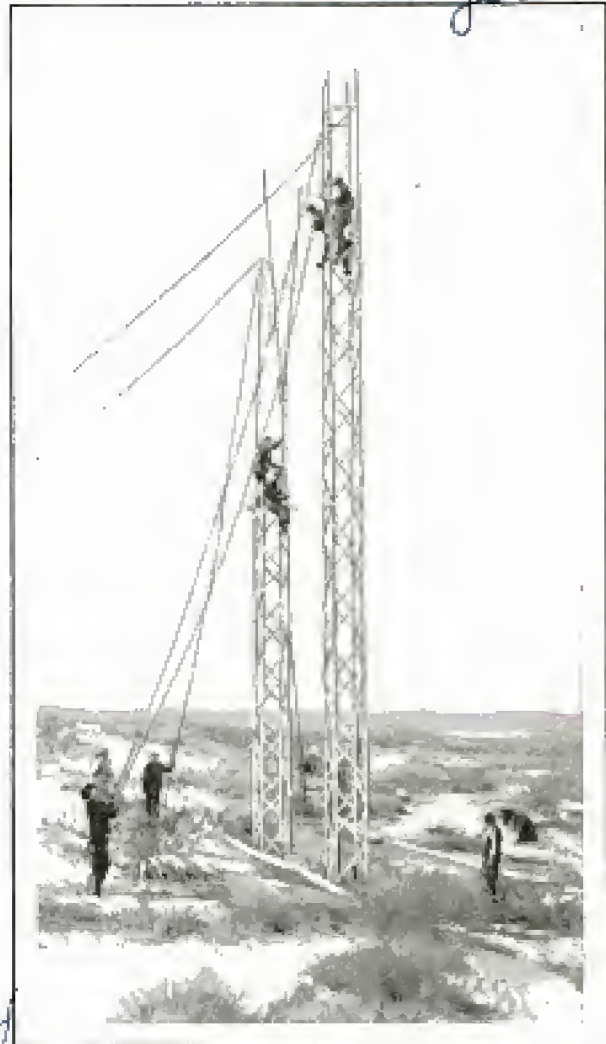
If, when out driving, you notice something that looks like birds sitting on telephone wires which do not fly when you approach, do not be alarmed, for chances are they will be the new type transposition brackets which are connected to the wires midway between the poles. Modern telephone lines used for long-distance conversation must be absolutely free from

noise and this is accomplished by balancing the line perfectly. To accomplish this balance, it is necessary to reverse or transpose the wires at certain intervals. So important are the exact locations of these transpositions that they are measured to the inch and not placed at the nearest pole as was formerly the practice.



tions that they are measured to the inch and not placed at the nearest pole as was formerly the practice.

Carl Ray Blair, Signal
Officer Ft. Hayes
Columbus, Ohio



Members of Construction Crew Erecting Steel Towers for Power Line, Climbing as They Build

RAISE SELVES BY BOOTSTRAPS IN BUILDING TOWERS

Climbing as they build, members of a construction crew erecting the steel towers for a power line in California and Nevada have found one efficient way to get up in the world. These men almost pull themselves up by their bootstraps as they erect the towers, placing one section then climbing on it to start the next. The line will furnish the power for the construction of Hoover dam.

FIRST RAILWAY IN AMERICA TO RUN LAST TRAIN

America's first steam railway line, operated between Carbondale and Honesdale Junction, Pa., a distance of twenty-three miles, will be abandoned, its owners have announced. They gave bus and truck competition as the reason.

U.S. Daily 5/20/31

Nevada, California Electric Corp

A-983

Ans. Walter
Carlos
Berlin, Germany

POPULAR MECHANICS



Electric Dance Instructor Enabling Pupils to Execute Intricate Steps by Watching the Disk

ROBOT DANCE MASTER SHOWS MANY INTRICATE STEPS

Sight and sound have been combined in an electric dancing instructor by means of which the members of a class execute difficult and intricate step combinations simply by following instructions flashed on a disk. These, being accompanied by sound, give the proper tempo. The dance machine resembles a loud speaker with space for dance steps and numbers.

STOKER CHANGES BLACK GANG TO WHITE-COLLAR WORKERS

One man, by merely pressing push buttons, stokes all the coal-burning boilers of a forty-seven-story New York hotel, supplying not only the heat for its 2,500 rooms, but also the power for all the hotel's mechanical equipment, from its private lighting plant to the delicate parts in the guestroom radio speakers. The stoker, who pushes buttons instead of a shovel, can even wear a white collar, for the equipment eliminates any necessity of his touching the coal from the moment it is dumped into the building's bunkers until it is hauled away as ashes. The furnaces burn pulverized coal, and when the boiler man presses a button, the precise

Hotel New Yorker

Process bought by The Sandviks Stachwarks

Grunden, Sweden
amount required is automatically weighed out from the bunkers, after which it is pulverized and blown onto the fires. Another button starts suction apparatus which cleans the ashpits four stories below street level, and blows the ashes into closed storage compartments seventy feet above. From these compartments they frequently are removed by trucks at the street level, again by suction process. More than \$100,000 annually is saved in lighting bills by hooking up the lighting equipment with a Diesel engine for private power generation.

IRON PLATED WITH ALUMINUM

Iron now can be plated with aluminum by a process invented by a Swedish metallurgist. The plating is done at a temperature of about 1,650 degrees Fahrenheit and the aluminum not only covers the surface of the iron but penetrates it, forming a kind of alloy which resists rust, oxidation and corrosion by gases and fluids. The process has been used with success in the manufacture of cold-drawn tubes and steel belt conveyors, and is expected to be applied also in the making of household utensils and dairy supplies.

ONE-MAN TRANSMISSION HOIST SAVES LIFTING BY HAND

Lifting the transmission assembly from an automobile is made a simple instead of a laborious operation with a one-man hoist that is portable, collapsible and adjustable. The hand-operated tool enables one man to accomplish easily a task usually requiring the services of two or more mechanics. The hoist spreads to thirty-eight inches, the ends of the curved frame being equipped with wheels which roll on the ledge where the floorboards rest. When extended to capacity, the hanger itself takes the load, and it is unnecessary to rest the wheels on a track or against anything substantial. It has a load capacity of 600 pounds and fits nearly all cars and trucks.

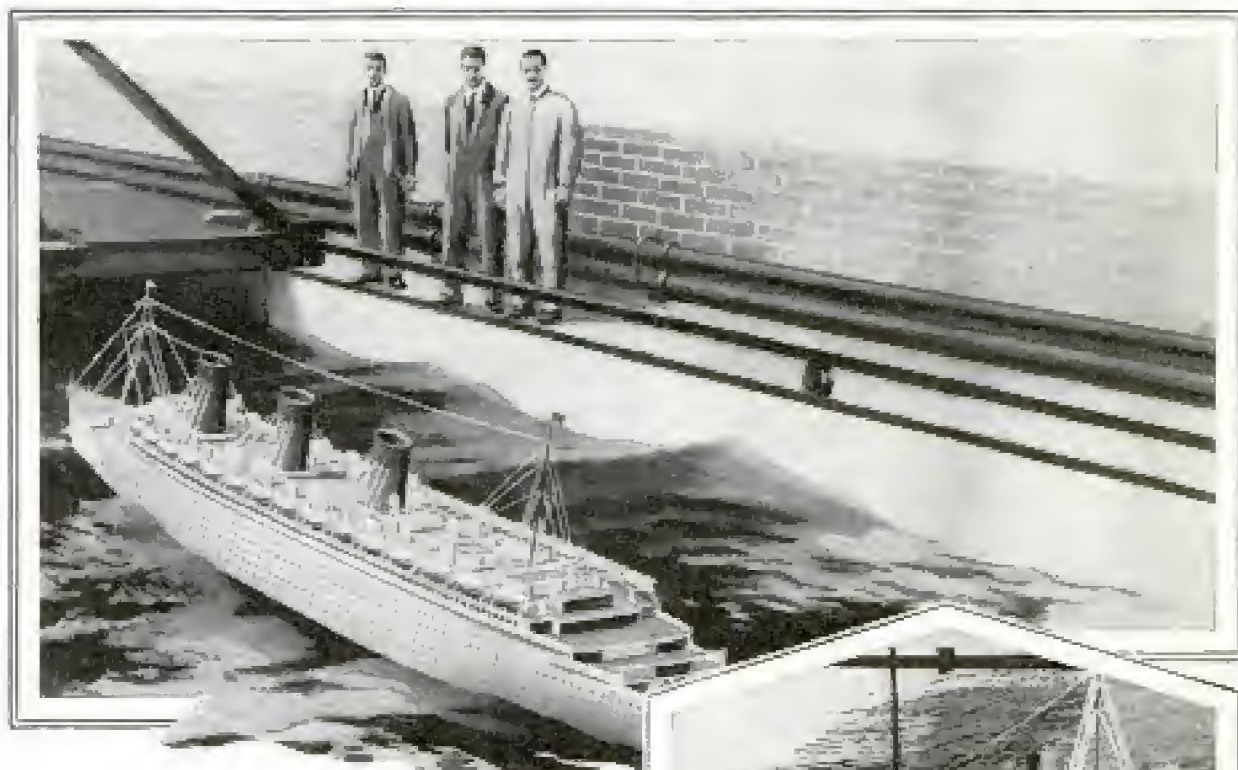


Ans. George A. Strader, 3425
88th St. Jackson Heights, N.Y.

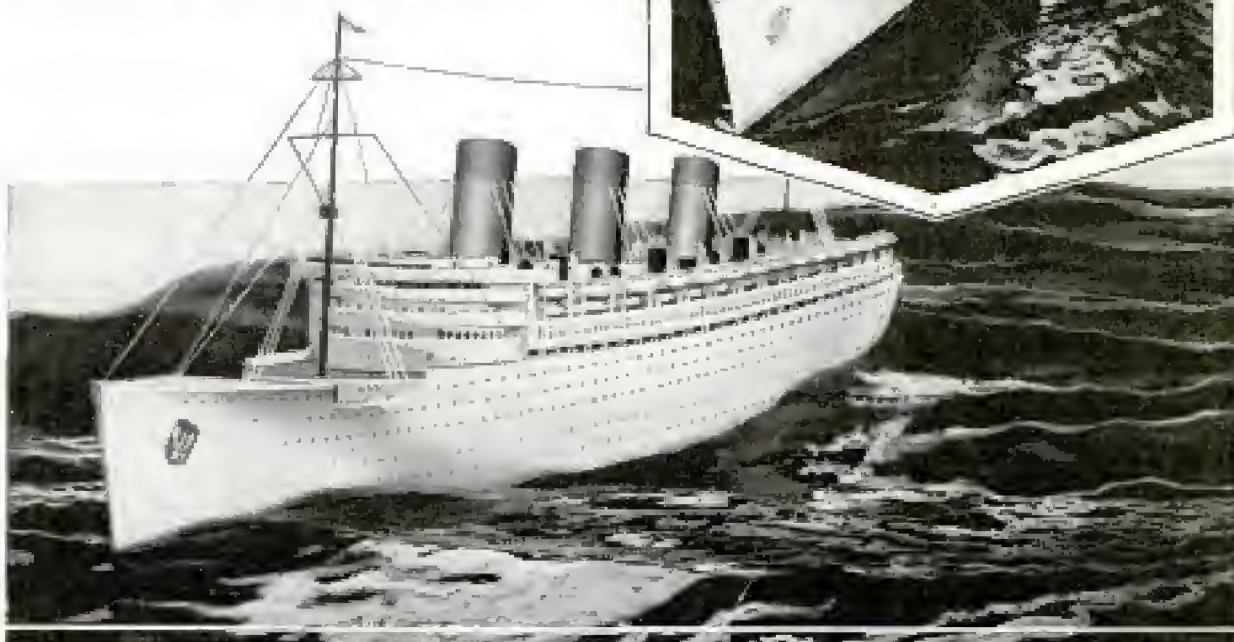
Shepard, Moore, Inc.
Cleveland, Ohio

A 1075 Built for Cunard line
at Clydebank.

ATLANTIC GALES IN TANK TEST MODEL LINERS



North Atlantic gales are produced in miniature in a huge tank in a Scotland shipyard where scale models, eighteen feet long, of what is to be the world's largest liner are tested. Ocean storms are simulated by an apparatus that makes waves like those a boat in a gale would encounter. The models are driven through the tank at full speed as the storm rages, and experts check the effects by electrical instruments attached to the hull.



a-830

Carl. John L. County, 714 Jefferson St
Washington, D. C.

On the Trail of the



TEN miles off the Jersey coast, a fast, small vessel is cutting the water swiftly and the captain watches nervously. A rum-runner is coming in, loaded with a cargo of liquor. Suddenly the course of the vessel is altered.

An hour later, a coast-guard boat is hovering around the spot where the rum-runner was last seen. But a radio code message to the captain of the "runner," from a hidden station on shore, has turned the trick and saved the cargo for the smuggling syndicate.

However, at the same time the radio operator on the runner was getting his warning, out in a small brick building on the lonely prairies of Nebraska, the code message was also received. As a result, the illegal radio station was ferreted out by department of justice operatives, silenced, and its owners were in the clutches of the law.

How was this done? How could a single person sitting out on the prairies of Nebraska have anything at all to do with the putting out of commission of this illegal station and throwing into the hands of the law the members of the rum-running syndicate? Let George E. Sterling, acting supervisor of a federal radio-monitoring station, of which there

are something like nine throughout the country operated by the department of commerce, tell the procedure.

"When we hear a station broadcasting that is unfamiliar to us, we listen in for the call letters at the sign-off. These are



Coast Guardsman behind One-Pounder. Ready to Enforce Command to "Heave To" After Patrol Has Intercepted Radio Message to Smuggler

then checked by our call-letter list, of which we have two, one foreign and one American, to see if it is a licensed station.

"After determination that the call letters of the station indicate that it is unlicensed, the frequency on which it operates is measured. Also, all the characteristics of the signal are carefully noted as well as the ability of the radio operator and any peculiar characteristics that he exercises in transmission, as, for instance, his failure to follow the procedure prescribed by international regulations. His failure to do so, incidentally, gives us a

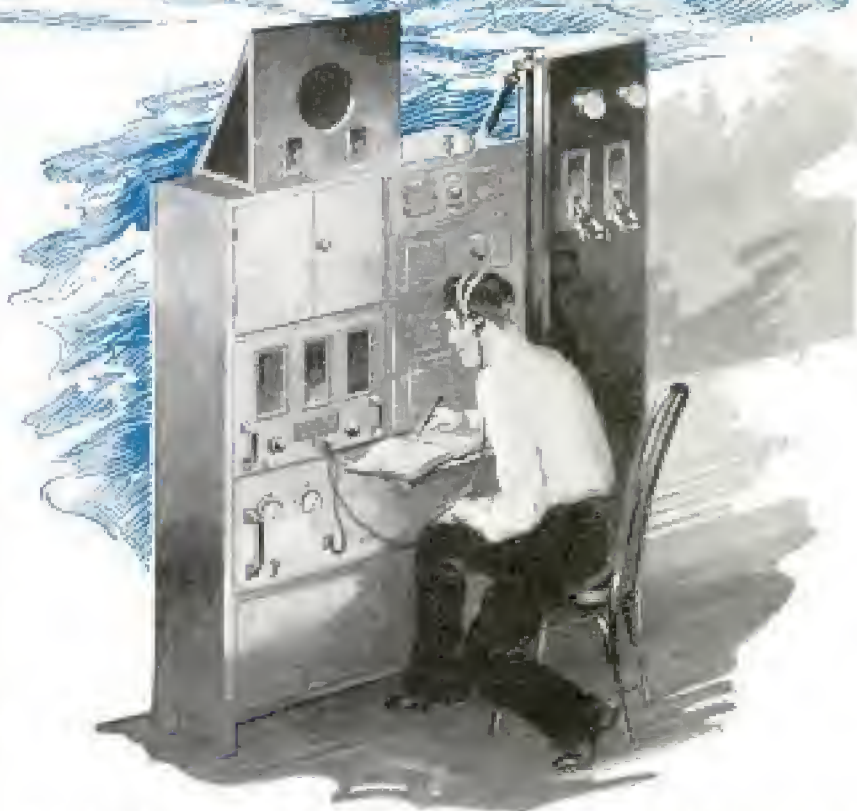
Radio Pirates

further clue that his station is unlicensed.

"Our next step now is to determine with what station or stations he has established communication, which, of course, includes their call letters and the ease with which communication, if established, is carried on. And right here it might be said that easily established communication, carried on without interruption or interference between the communicating operators, indicates close proximity of the mobile station to some other mobile station or master control station on land.

"Every call letter, signal, word or group of words is now copied for the purpose of interpreting the message which, in general, is transmitted in a complicated code or cipher. A code, I might say here, is a pronounceable group of letters; a cipher is an unpronounceable group of letters or figures, or combinations of both. When the message has been copied, we decipher it ourselves if possible; if we are not able to do so, we turn it over to special agents in the department of justice.

"Now, let us suppose that we have picked up a shore-to-ship message of a rum-running syndicate, warning a ship's captain that a federal patrol has just left port to search him out. We get the message in code and the call letters of the sending station. The station, we easily determine by looking in our call-letter book, is not licensed. The code we de-



Here Is a Conventional Type of Short-Wave Transmitter and Receiver Used by Amateurs; Similar Equipment Can Be Employed Illegally

cipher. But still we are a long way from the station's location. To get this we must repeat the operation of listening in as often as possible, determining as much as we can about the station, character of the signal, peculiarities of the operator in sending, and the direction from which the message is coming. Gradually—it may take weeks and months—we work out the station's location from this and other data gathered by use of automobiles equipped for testing frequencies and power, moving them here and there until the end sought is attained.

"Once the 'bootleg station' has been located, the information regarding it is turned over to the department of justice. Here our work ends unless the station is to be raided. In this case radio experts go along with the raiding party to establish technical evidence of the use of the



radio illegally. The radio men test out the apparatus and establish beyond a doubt that the transmitter is capable of carrying on the communication with which it is charged.

"Measuring the frequency of an illegally operated station, or a legally operated one for that matter, is rather an involved process. Briefly, the frequency is obtained by comparing the incoming signal from the receiver with the frequency of a meter—a specially designed measuring instrument."

In the new constant-frequency monitoring station at Grand Island, recently completed and equipped, there has been installed one standard of frequency having an accuracy of one part in a million, and one secondary standard having an

accuracy of one part in one hundred thousand. In addition, there are five receivers, two of which operate on a frequency of 30,000 to 1,500 kilocycles, two on frequencies from 1,500 kilocycles to 100 kilocycles, and one on frequencies from 100 to ten kilocycles. This enables the measurement of all us-



Above, Portable Set Used by Federal Radio Experts in Autos to Trace Illegal Stations; Below, Radio-Equipped "Kumner" Fleeting Coast Guard

able frequencies in the radio spectrum.

During tests of the apparatus at the time of installation, says an official of the radio division of the department of commerce, under whose administration the conduct of the monitoring stations of the government falls, over 300 broadcast stations were received, as well as a number of other services in the United States. In addition, reception of stations in Chile, Canada, Cuba, Portugal, France, England, the Philippine Islands, Hawaii, Argentina, Peru, Netherlands, Brazil, Panama, Costa Rica, Nova Scotia, Russia and many others in the world is recorded.

Monitoring of stations operating on the frequencies which can be measured at Grand Island cover the following classes of service: transoceanic; telegraph and telephone; marine, operating on high, low and intermediate frequencies; marine coastal; aircraft; aircraft ground stations; various point-to-point services; broadcasting; amateur; televi-



© Henry Miller
Federal Radio Transmitter and Receiver, Mounted in Auto and Used to Track Down Illegal Stations



Picture Shows How Rum Is Transferred from a Vessel to a Fast Motorboat outside Twelve-Mile Limit; When Motorboat Leaves, the Vessel Radios Notice of the Fact to Headquarters on Land

sion and facsimile—to say nothing of the pirate stations among which is to be numbered the bootleg station.

The Grand Island station covers a fifty-acre site approximately seven miles west of the city. This site was chosen after a middle-west survey as being most desirable for the important work to be done in monitoring, because of little or no man-made interference at this point and because stations in foreign countries as well as continental United States were regularly received without difficulty there.

FIVE-HUNDRED-MILE AIR SPEED FOUND HIGH OVER ALASKA

Fourteen miles above the weather bureau station at Fairbanks, Alaska, a small hydrogen-filled pilot balloon was observed moving at a speed of 574 miles an hour. The perfectly clear air enabled observers to keep the balloon in sight, through powerful glasses, for a distance of forty miles. According to reports, this sounding of the upper air currents establishes a new

record for altitude. As the pilot balloon ascended it found twenty-five-mile-an-hour wind currents at the seven-mile level. Two hours after its release, the balloon had reached an altitude of fourteen miles, at which time its velocity was checked by means of the special scales and equipment developed for the weather bureau.

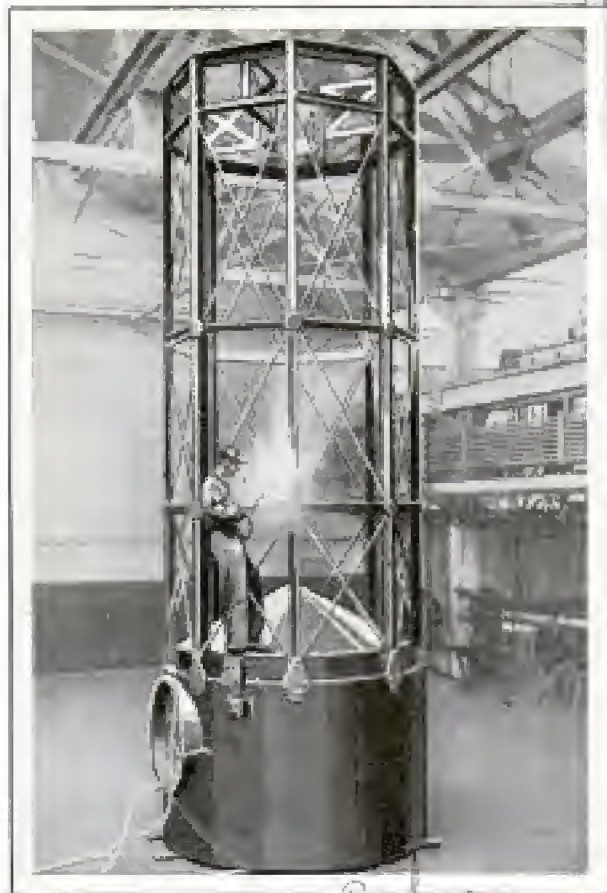
There are no telegraph, railroads, power lines or residences within three miles of the station. Illegal stations are, as a rule, operated on short wavelengths. They are not so easily detected, and the antennae of such a station may easily be located in a house. Such stations have an operating range of over 1,000 miles. The radio-equipped automobiles, which in the last instance run to the ground such stations, are equipped with portable sets and a number of them are assigned to each federal radio district.

Electricity is the only domestic item costing less now than in 1913, according to a recent survey of thirty-two cities.

Cont. J. W. Fickler 5021
12th, N.E. Seattle
Wash

a-10-11
204

Com. Arthur A. Young
Editor Chinese Christian
Student 34 7 madison
ny



Large Telescope Tube Being Electrically Welded to Provide a Greater Degree of Rigidity

GIANT TUBE OF TELESCOPE IS ELECTRICALLY WELDED

Electrical welding of joints, replacing the use of rivets or bolts, is expected to produce greater rigidity in the telescope tube being built for the observatory at Ohio Wesleyan University. The tube, twenty-two feet long, is the first of its kind to be constructed by means of electrical welding. The rigidity obtained through welding will, astronomers believe, insure accuracy of observations. The tube will carry the first large telescope mirror to be made in the United States, a product of the bureau of standards.

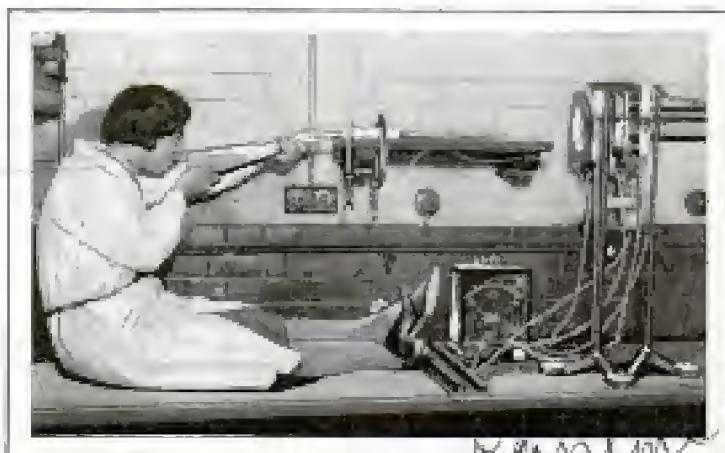
CHOP SUEY ORIGINATED IN AMERICA NOT CHINA

Contrary to popular belief, chop suey was born in America and not in China, for even today it is not found anywhere in the Orient. Many stories are told of its origin but the one generally accepted attributes its invention

to Marshal Li Hung Chang. During a trip to America, he planned a feast for friends and was asked to serve something Chinese. Unable to obtain Chinese food-stuffs, according to the story, his cook did the best he could with American materials and succeeded in giving the dish an exotic tang by using a Chinese sauce made from soya beans. American guests who sampled the dish with chopsticks were quite enthusiastic and asked its name. The marshal did not want to disillusion his friends, so he glanced at the chopsticks and the sauce and replied, "chop soya." His friends repeated the name as "chop suey" and it has been that ever since. News of the banquet was quickly relayed to San Francisco where a Chinese restaurant had been opened, and chop suey soon appeared on the menu, to be followed by the spread of such eating houses and the inevitable American product with its Americanized Chinese name.

SPEED OF BULLET IS RECORDED ON SIX-INCH RANGE

Accurate measurement of the velocity of a rifle bullet is given by a simple recorder that indicates precisely the time required by the bullet to travel through a six-inch range. The recorder is electrically operated and the bullet breaks a tinfoil fragment at one end, interrupting the current. At the other end of the range, it breaks another piece of tinfoil, re-forming the circuit as it emerges from the recorder. The time between the break and connection is shown on a dial from which the speed of the pellet is computed easily.

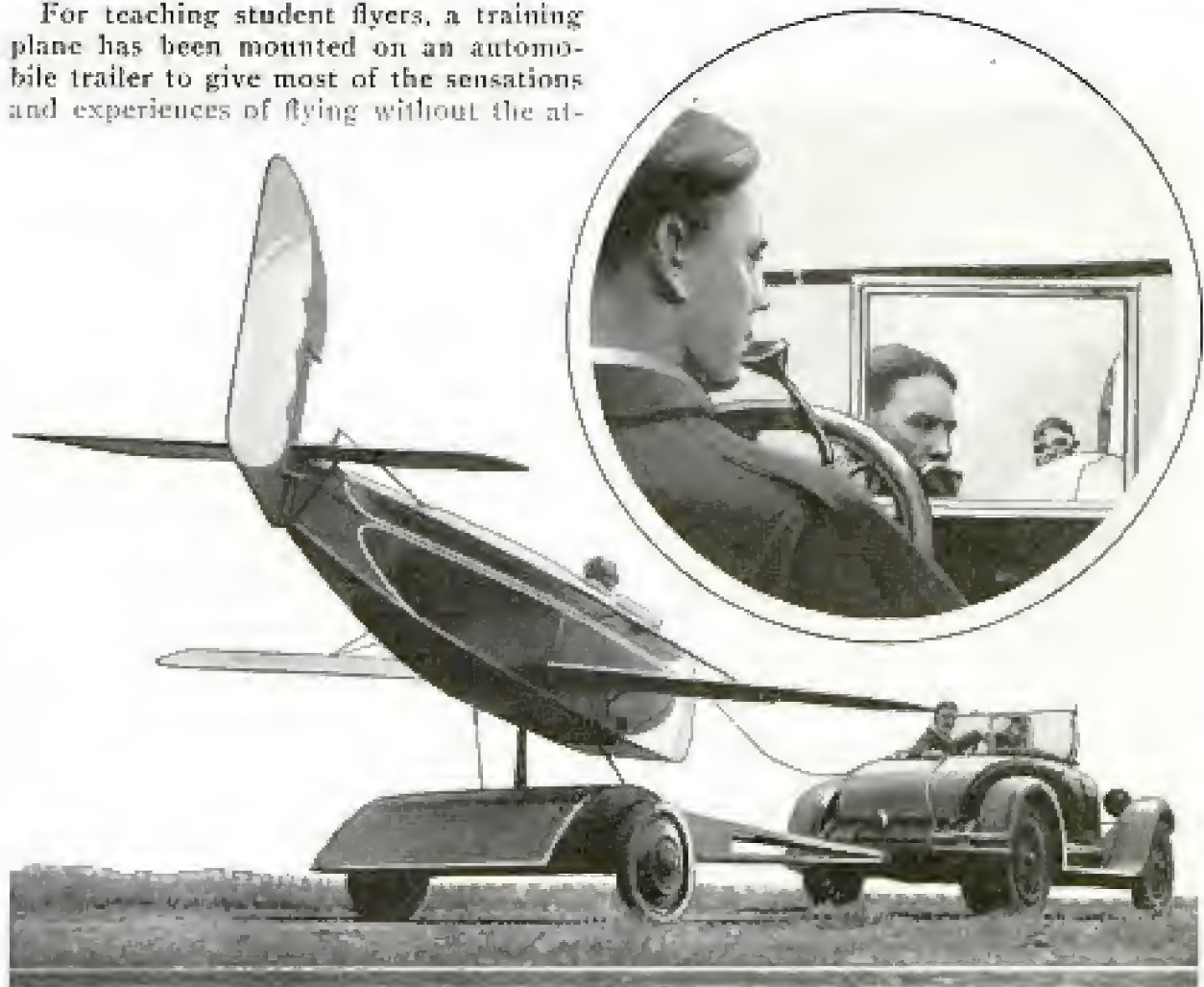


Firing Rifle into Electric Recorder Which Times Speed of Bullet as It Travels through Six-Inch Range

Shangai Scientific Institute
Polytechnic
Hollway Road, N. C. 1000, Chn.
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ALL THRILLS OF FLYING WHILE SAFE ON GROUND

For teaching student flyers, a training plane has been mounted on an automobile trailer to give most of the sensations and experiences of flying without the at-



Pilot Trainer Mounted on an Auto Trailer to Give the Student Experience in Handling a Plane; Circle Shows Instructor in Auto Watching Maneuvers of Pupil in Large Rear-View Mirror

tendant dangers to the novice. The trailer runs on rubber-tired wheels and contains a frame on which the training plane is set on a steel rod with a ball-and-socket connection. This arrangement allows the student to put the training plane through all the movements of a ship in free flight as the instructor tows him about the field. On the automobile windshield is a large mirror in which the instructor watches the student's maneuvers.

DOES EARTH FACE A WARM AGE AS RESULT OF INDUSTRY?

Earth, according to geologists, is getting warmer. And its recovery from the last ice age may be speeded up a little by the increasing combustion of coal in the furnaces of factories and homes. Burning coal releases carbon dioxide into the

air and it is believed that the increase or decrease of carbon dioxide has much to do with changes in the average temperature of the earth's surface. Studies in the U. S. naval research laboratory have shown that the average temperature may be raised ten degrees by doubling the amount of carbon dioxide in the air. To do this, however, would require the burning of 1,000 tons of coal for every person in the world. While the total present coal consumption is less than one ton a year for every person, it is considered that the effect of releasing even that much carbon dioxide into the air may be a slight increase in temperature. Experts believe that ice ages have resulted from a reduction of the carbon dioxide in the air, and that lowering the earth's average temperature ten degrees will suffice to bring on a glacial period.

E. O. Hulbert, Naval Research Laboratory.
 21st. Daily 5/18/31
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Launching a Turbine Ship Which Will Carry Automobiles from Detroit to Atlantic Seaboard; the Vessel is 300 Feet Long

TURBINE SHIP TO CARRY CARS FROM DETROIT TO SEA

Second ship of its kind on the Great Lakes, the turbine ship "Chester" was recently launched and prepared for service as a carrier of motor cars from Detroit factories to the Atlantic seaboard. These all-metal turbine ships are 300 feet long and, in their specially designed hulls, have space for 2,000 tons of crated motor cars.

ANIMALS OF OLD WEST GIVEN MISSISSIPPI RESERVATION

If present projects of the government materialize, the game reserve created by congress in the bottom lands of the lower Mississippi will be stocked with bison, antelope, elk and other animals which used to make that country their home. Reports of early French explorers and Indian legends indicate that these bottom lands were once thick with hooved and horned animals. The coming of civilization forced them out of their native haunts and some of the animals are today almost extinct. It is believed that the engineering work planned to convert

the 300-mile strip of bottom land into a chain of lakes flooding it permanently, will produce conditions under which the animals will flourish.

SANDING-MACHINE DUST REMOVED BY SUCTION

Dust has been virtually eliminated in the operation of a portable hand belt-type of sander by equipping it with a suction attachment that operates like the ordinary vacuum cleaner. The dust-removal system has been built into the tool, a double-bladed fan creating a vacuum to draw the dust through ports directly back of the belt. The dust is deposited in a bag and is removed through a zipper opening. The bag itself is easily attached or detached by a single twist of a coupling. The dust remover not only keeps the air clean but prevents the abrasive belt from becoming clogged, thus lengthening its life. The motor is laid horizontal to the frame to give the machine better balance and place the weight over the sanding shoe.

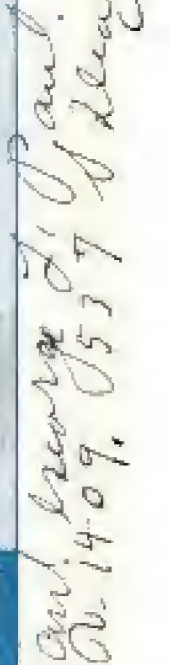


Sander Equipped with Suction Attachment Like a Vacuum Cleaner to Catch Dust and Dirt

Parlor Cable Hutchison Corp 100 Wall Street New York

Gerrion Bailey & Co. Biological Survey.

Peter P. Fechner
Berlin-Gehlendorf
MECHANICS 2075
Am Negevinkele 58.
SERVED BY PLASTER MASKS
Germany



Q 10 35
208

From the Works
6/2/31 R-506



Airport Traffic Tower from Which Pilots Receive Orders by Radio; the Tower Operator Also Controls the Lights for the Field

AIR-TRAFFIC CONTROL TOWER GUIDES PLANES BY RADIO

From a traffic tower at the Cleveland municipal airport, pilots are guided in taking off and landing by means of a short-range voice radio transmitter. The system is of particular benefit to flyers approaching the field, as they are informed in advance of ground conditions. In addition, the tower includes an apparatus by which the position of all airline planes leaving or approaching Cleveland is marked on a map and may be seen at a glance. All field boundary lights, obstruction lights, building lights and flood-lights also are controlled from a switch-board in the tower.

TEARS POISON TO GERMS

Tears have a very practical purpose. An English biologist has discovered that tear fluid, even greatly diluted, is an exceedingly powerful destroyer of bacteria.

The bacteria poison in tears is so strong that a solution of 40,000 parts of water to one of the fluid fully retains its germicidal property. Presence of this powerful antiseptic in the tear ducts undoubtedly protects the eye from many germ-carried ills.

READY-MADE ARCH PROVIDES BASE FOR PLASTER

Ready-formed metal arches are being offered as a building accessory to provide a unit plaster base of symmetry and uniformity for all types of doors. The arch is nailed to the rough bricks over the lath, and in one operation the plastering base and the corner bead are in place. The metal bases eliminate two difficult operations, the construction of curved

wooden forms for the arches and the shaping of corner beads around curves. The beaded edge of the arch can be continued on the straight runs with regular corner beads, and perforated flanges in the metal afford excellent keying for the plaster and keep it from cracking. The arches can be obtained in several sizes.



Ready-Formed Metal Arches Which Provide a Symmetrical Plaster Base for Such Types of Doors

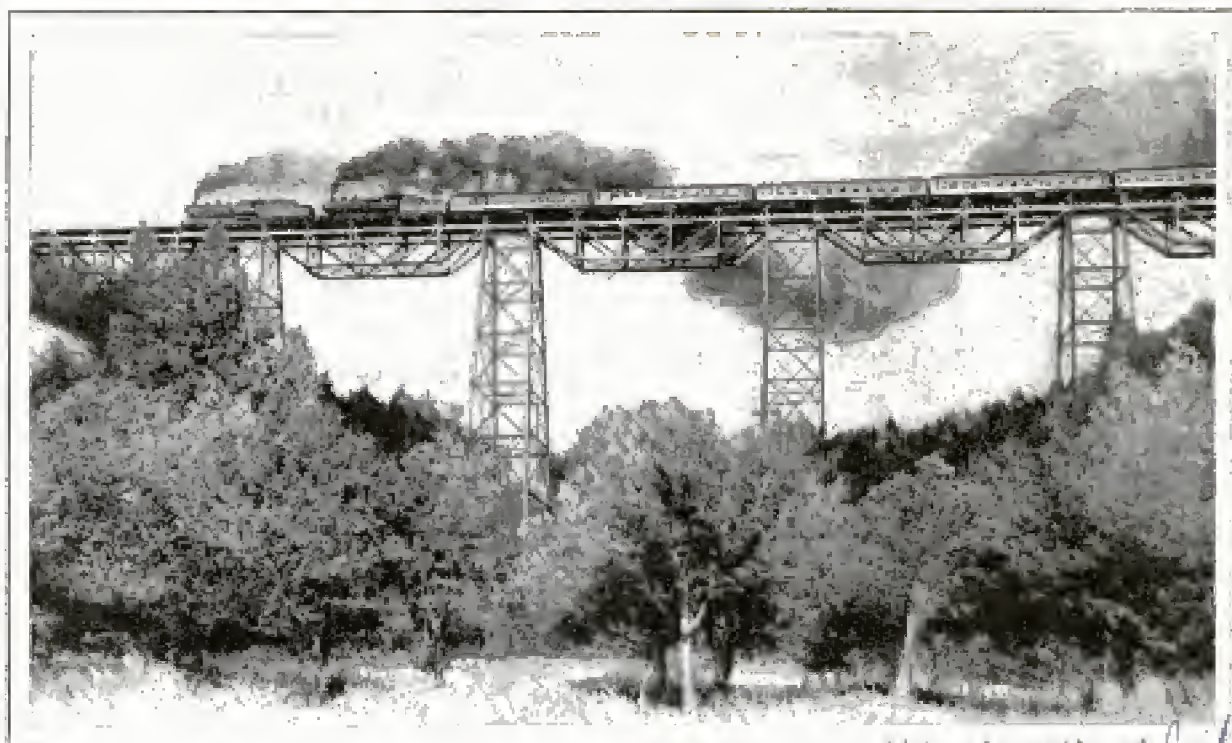
United States Insulating
Co., 300 W. Adams Chicago

Fleming

a-1100

4/2 000 8 3.50

RAILROAD ON STILTS CROSSES VIADUCT IN ROCKIES



Passenger Train Traversing a Railroad on Stilts; This Viaduct, near Missoula, Mont., Is 226 Feet High and 797 Feet Long, and Represents a Remarkable Feat of Railroad Engineering

Building a railroad through the Rocky mountains entails many remarkable feats of engineering of which one of the most striking, from a scenic angle, is the Marengo viaduct on the Northern Pacific system, a few miles from Missoula, Mont. This viaduct, stretching from one elevation to another, is literally a railroad on stilts. It is 797 feet long and 226 feet high, and, from below, a train crossing the span looks like a toy locomotive and coaches.

DREAM OF TUNGSTEN PLATING FINALLY COMES TRUE

Tungsten plating, long a dream of chemists, now can be made through an electric process discovered by Prof. Colin G. Fink, of Columbia University, who also was the first to plate chromium commercially. Tungsten plate appears even whiter than silver, because it does not tarnish when exposed to the air. In addition, it is one of the hardest of metals, is insoluble in acids and has a melting point of 6,150 degrees Fahrenheit. These qualities make it useful in industries depending on chemical processes where resistance to heat and acid is important. If household

utensils of tungsten plate come into general use later, the polishing labors of the housewife will be ended and, plated on aluminum, it will give an article of great lightness and durability. At present, however, it is particularly suited for electrical contacts and arcking points subject to great temperature changes. The plating process involves the passing of an electric current through a water solution of sodium tungstate. In this manner, deposits of metallic tungsten have been produced on a variety of metals, including brass, copper, zinc, iron and carbon. The plated surface is smooth, hard and coherent, having a high luster. Tungsten plate is superior to chromium because the latter melts at a lower temperature and is soluble in hydrochloric acid.

SELF-INFLATING BICYCLE TIRES

Bicycle tires are kept at a constant pressure by a small pump built into each wheel. A German inventor has demonstrated that this device, which is driven by a cam on the hub of each wheel, automatically goes into action when the tire pressure falls below normal and stops when proper inflation is reached.

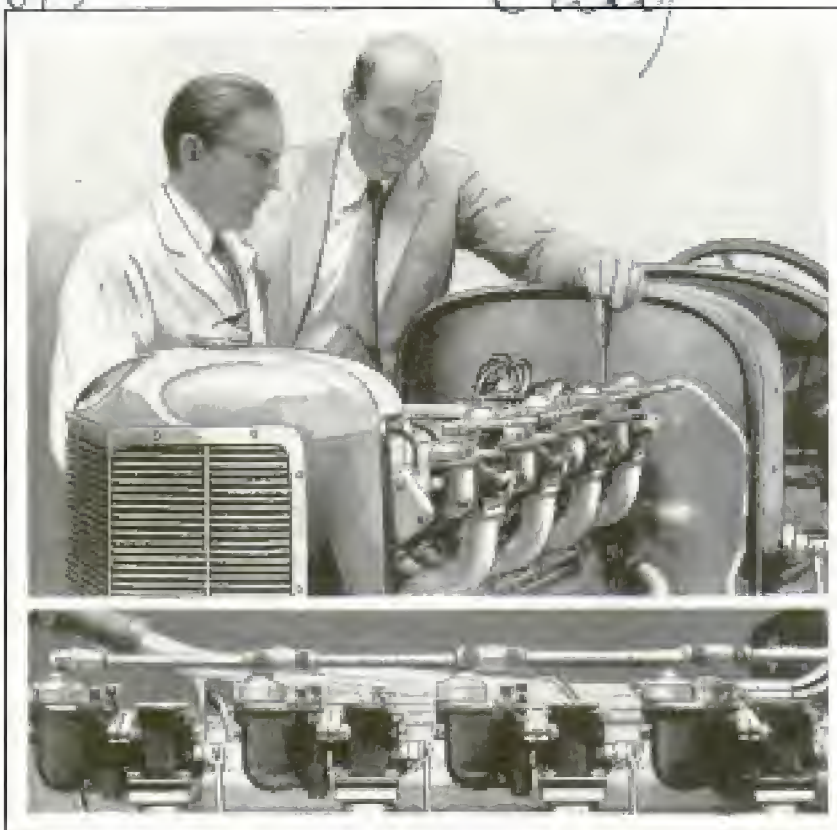
J. Erdmann & Co.
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Electrochemical Dept.
New York City

A. 100 6

Science Service
528-5/8/31

Winfield Carburetor Co. Ltd.
Box 698, Glendale
Calif.
210
A 1015
POPULAR MECHANICS



More Cylinders Have Brought More Carburetors for the Racing Auto: Here Are Shown Four Carburetors, One for Each Pair of Cylinders

FOUR CARBURETORS ADD SPEED IN EIGHT-CYLINDER RACER

One carburetor for every two cylinders is the practice in building many of the racing cars which are going after records this year. Multiple carburation eliminates the possibility of "starved" cylinders and adds punch when it is needed. Four, eight and sixteen-cylinder racers have gone over to the "one to two" principle with the result that both designers and drivers expect to hit speeds well above former best records. Double and multiple carburation in racing cars is believed to indicate that ordinary automobiles may soon be similarly equipped.

PARAFFIN WAX MADE INTO OIL FOR HIGH-GRADE MOTORS

Paraffin wax, the petroleum by-product formerly considered of least value as a lubricant, has been found to have in it the elements most desired by oil chemists in their search for the "perfect" lubricant. Millions of dollars were spent in the development of refining processes which would eliminate the paraffin wax; large

amounts are now being spent to produce the paraffin-wax motor oil on a commercial scale. The oil made from the once shunned wax is at present expensive, due to the complicated processes which are necessary, but tests have shown that it is less affected by temperature changes than any other known oil. It can be made thick or thin and has been found useful for airplane engines, auto gear shifts and shock absorbers, etc.

A-1012 "ONE-WAY SCREEN" USED IN STUDY OF BABIES

"One-way observation" has been made possible by a special screen developed for the use of students in the Yale institute of human relations. The curious dome-shaped screen completely hides those on the outside, but permits them to see clearly whatever goes on inside the dome. This equipment is particularly useful in the observation of infants and children who would otherwise be distracted by the presence of the watchers. Entirely unaware of the observers the children meet the various tests naturally and instinctively.



One-Way Screen Which Permits Observers to Watch Infants in Nursery without Being Seen

A 1016
Standard Oil Co. of Indiana
910 S. Michigan Ave.
Chicago

at New Haven
Copyrighted material

design painted
in 1908
not on market previously
this is plan in 1908

A-986 Cmt. Walter E. Burton,
1082 Florida Ave Akron, Ohio

The TRUTH about OUR NATIONAL BIRD

HATCHING of three eagle eggs recently marked the final chapter in a long study by Dr. Francis H. Herrick, of Western Reserve University, to solve the mystery of the American, or "bald" eagle's life history. For years Doctor Herrick has been building towers near eagle nests, and watching and photographing the home activities of the birds.

The tower method gave but a part of the

Cleveland Hens



Eighty-Foot Tower and a Platform on Which a Tent Was Placed to Observe the Eyrie of an American Eagle at Vermillion, Ohio; Below, Female Preparing to Feed Hungry Youngster

whole story because of its distance limitations. Until Doctor Herrick found three eagle eggs in Canada and brought them to Cleveland Hens, no one knew

how a young eagle was hatched, or how it grew up.

The coming-out process of an eaglet showed unusual mechanical abilities. On



the upper mandible of the eaglet's bill, near the tip, is a sharp spur or "egg" tooth." With this the bird makes perforations about the circumference of the shell. Then, by exerting pressure outward on the two halves of the shell, the eaglet creates a crack and enlarges this gradually until the egg splits apart, and the eaglet begins its life cycle. As the bird grows older the egg tooth disappears.

At Vermilion, Ohio, on the shore of Lake Erie west of Cleveland, a pair of American eagles had established their home prior to 1840. Ever since, these eagles or their successors have maintained nests and reared young in the same neighborhood. The eagle, like many of its human neighbors, mates once, and, barring accidents, for the remainder of its life. An eagle in captivity in Vienna is reported to have lived 104 years.

Both mother and father eagle, it was learned, engage in the nest building. This is not a difficult task for these large birds. Swooping low over fields, they pick up bunches of hay or dead weeds in their talons. Sticks, some as much as six feet

in length and two to three inches in diameter, are carried to the nest. An adult eagle weighs from eight to ten pounds and has a wingspread as great as seven to eight feet.

Although farmers are inclined to blame eagles for loss of numerous chickens, turkeys, and even lambs and small calves, Doctor Herrick has found that the eagle does not deserve such reputation. True, he likes chickens, but his taste is satisfied only occasionally, so that each farmer near an eyrie will lose perhaps a fowl or two in a year.

When the young Vermillion eagles were reaching full growth, they put on an interesting show for Doctor Herrick

and the other observers. Using sticks for playthings, they whiled away the hours much like human children do. But their play often had a purely practical purpose. They engaged in flying exercises that gradually resulted in their acquiring full power



Top, Eagle Carrying a Fish; Center, Eleven-Day-Old Eaglet; Below, Close-Up of Eagle's Nest

to conquer the winds. First flights attained an altitude of a foot or two above the nest, and first trips beyond the rim were made for very short distances.

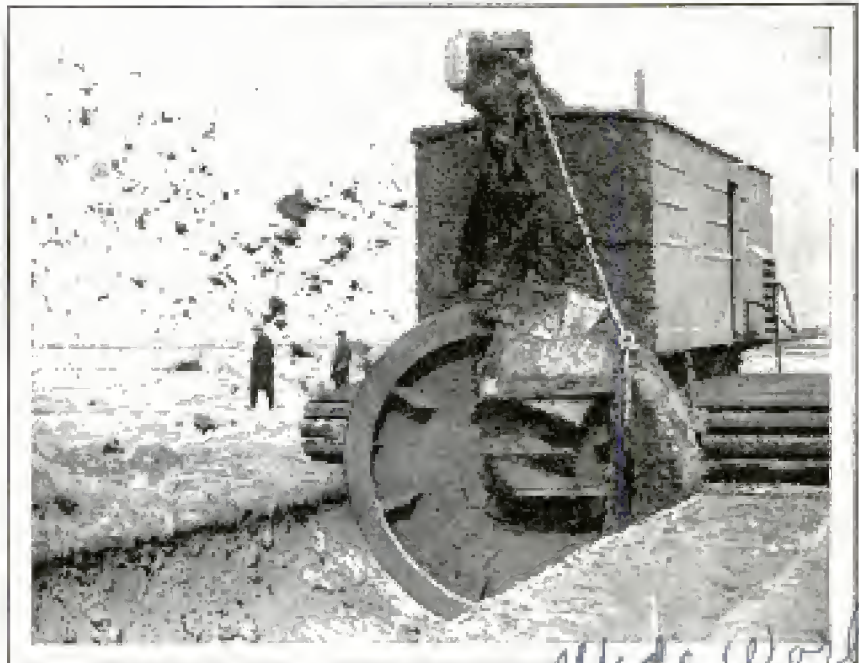
It is only when his home is molested that the eagle becomes the warrior he so often has been pictured. Then he will attack man or any other intruder.

You probably have observed that the eagle appears in the decorative scheme of bank interiors and that sometimes the reproduction shows a bird with feathered legs. This is illustrative of one of the kinds of misinformation about our national bird. The true American eagle wears no feather leggings. Furthermore, the researches have proved that no other bird could have been selected that would have displayed greater courage, intelligence, majesty and faithfulness so desirable in a nation's hero.

FREE WHEELING FOR ANY AUTO IN ONE SIMPLE UNIT *a 1042*

Any make of automobile, truck or bus now can be converted to the free-wheeling type of car by installing a simple unit that operates by vacuum to disengage the motor and allow the car to coast when the foot is lifted from the accelerator. The unit is attached to the dash under the hood and connected to the clutch pedal below the floor. It consists of a cylinder and piston connected to the intake manifold with a copper tube. The piston is operated by the vacuum caused by the idling of the motor, thus releasing the clutch. The vacuum is relieved when the accelerator is depressed. A button on the dash converts the car to the conventional gear shift, and a safety appliance automatically starts the motor, should it die while free wheeling. *\$18.00*

Ⓒ A long-distance gliding record of 165 miles has been made in Germany.



Rotary Trench Digger Operated Like Snowplow; the Revolving Blades Cut into the Soil and Send Up a Shower of Dirt

WHIRLING WHEELS DIG DITCHES FOR WATER PIPES

Along the shores of the Zuyder Zee, Holland, a fleet of rotary trench diggers is busy excavating for a new drinking-water system. The trench machines use swiftly revolving blades which cut into the soft soil and send up a constant shower of mud and dirt. In principle, they are much like rotary snowplows. As the trench diggers move along, crews of workmen lay the pipes.

SELF-AERATING MINNOW PAIL KEEPS BAIT ALIVE *a 1001*

To keep minnows alive for longer periods, the inside container of a perforated bait bucket is made of porous material



that lets air reach the fish without draining the water. As lack of oxygen in the water causes minnows to die quickly, the self-aerating bucket obviates this difficulty and keeps the bait alive longer than in an ordinary container.

Safety Free Wheeling Co.
540 N. Michigan Ave.
Chicago

Shakespeare Co.
Kalamazoo, Mich.

STEALING LAND FROM A LAKE TO BUILD A PARK



solving its problem of finding more room for expansion by pushing back the lake and manufacturing its land. Much of Lincoln Park, on the north side, today stands on made land, formed by building jetties into the lake and filling in the lake front, allowing the water itself to help with the task by bringing in sand. To alleviate its growing pains the city now has under way a huge reclamation project providing for the making of 250 acres of park land out of what at present is water. It will cost \$4,000,000 and



General View of a Section of Chicago's Lake Front Composed of "Made" Land, Formed by Filling in Sand along the Shore Line; Above, One of the Big Sand Boats Dumping Its Load

Chicago is growing so fast that it is spilling over into Lake Michigan and is

7,000,000 cubic yards of sand will be used to fill in and extend the shore.

MICHELSON'S LAST LIGHT TEST WILL BE SURVEYING AID

Although the originator of the experiment is dead, the world's most precise determination of the speed of light is to be completed by the associates of the late Dr. Albert A. Michelson, famous scientist. At the time of Doctor Michelson's death the experiment had reached a stage where his associates were able to fix the tentative value for the velocity of light resulting from the work as about the same as that obtained from the scientist's previous experiment on Mt. Wilson. A

few days before he died, the physicist dictated the outline for a scientific paper which eventually will announce to the world the most precise value of light's speed. The mile-long tube in which the present experiment is being performed, is located near Santa Ana, Calif., cost \$50,000 and took two years to build. Its length is accurate to one part in a million. Its welded construction made it possible to exhaust virtually all the air in it and pumps are run day and night to preserve the near vacuum of the mile-long cylinder, which is three feet in diameter. The tube gives the first oppor-

University of Chicago
meniscus

Probably Physical Review

1500

Science Service Bulletin 529-A. 5/11/31

tunity to measure the speed of light in a virtual vacuum. The previous measurements were made by sending a beam of light from a distant mountain peak to a revolving mirror on Mt. Wilson. This gave a figure of 186,290 miles a second, which is believed to be accurate to within about three miles per second. When the present experiments are finished, the measurement is expected to be so exact that it will be possible to use the speed of light as a yardstick in precise surveying.

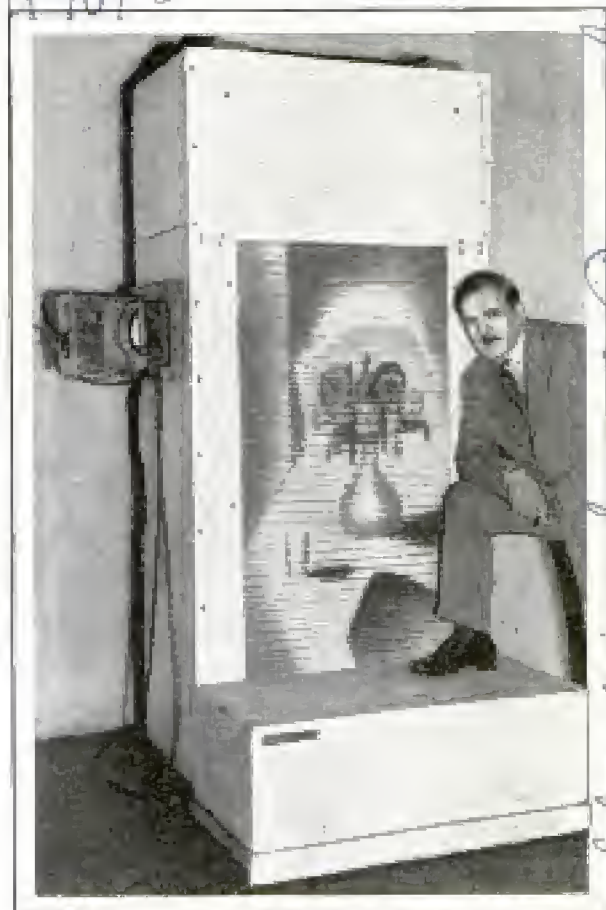
MOWER RUNS HAY IN CRUSHER TO HURRY CURING PROCESS

To lessen the time required for curing hay and alfalfa, a power mower is equipped with a crusher somewhat like a clothes wringer that squeezes out the moisture as the grass passes between rubber-covered steel rollers. The cut hay falls on a draper which elevates it to the rear of the mower where it passes between the rollers mounted parallel to the cutter bar. The lower roller is held rigidly, and the upper floats under a 2,000-pound tension maintained by two springs. All of the stems are crushed by the rollers, and the internal moisture is pressed out to be taken up by the sun's rays. Alfalfa, cut in the morning of a good drying day, is ready to put up late in the afternoon and the hurrying of the curing process results in less bleaching. The whole unit is mounted on a tractor. The cutting, elevating and crushing mechanism is driven through a chain from a sprocket on the pulley jackshaft of the tractor.



Power Mower That Runs Hay or Alfalfa through a Crusher, Made Like a Clothes Wringer, to Lessen Time Required for Curing

Being developed by the
Wood Machinery Corporation
Salem, Mass.



Boxlike Apparatus Which Shows Paintings in Motion, Effect Being Similar to Moving Pictures

ART OF THE FUTURE IS SEEN IN MOVING PAINTINGS

Motion has been added to art by an apparatus recently demonstrated in New York which literally shows paintings with the images moving. The effect is somewhat similar to moving pictures, since the boxlike moving painting machine reveals, on one of its two faces, many varied designs and pictures, constantly moving, and each a complete and perfect image. On the opposite face is the picture of a woman in many poses and costumes, also constantly changing as a score of belts move on a turnstile arrangement. While thirty-two assorted images are now the capacity of the device, the future range for change and movement is said to be virtually unlimited.

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1013
School for Social Research
66 W. 12 St. New York
Mr. Alexander Archipenko

a 919. Cmt. Andrew B. Boone
613 Spruells Theater Bldg
San Diego, Calif

The New Wonders of



AN AGED actor, the dark lines of many years shadowing a once-handsome face, breathes the fumes from a potent compound. He seeks eternal youth.

"Is it to be failure?" he asks, "or"—as he turns his face again into the fumes—"is it to be success?"

On the screen, in a test picture, the gray lines of his face gradually disappear. Youth comes to one side of his face and in a few seconds, as the camera continues to grind, spreads across his countenance.

Here you have one of the most intricate tricks of movie make-up, accomplished not so much by the camera as by the make-up artist. No abrupt change, such as would be obtained by stopping the camera and replacing the actor an hour later in the same spot, but a gradual, though rapid, counterevolution from sixty years to twenty.



Make-Up Room, Above; Below, the Artist Makes "Age" by Penciling in Lines around the Eyes

Here's the trick: The actor is made up to look like a sixty-year-old professor. His eyebrows, lips and hair are red. The

Movie Make-Up



Often Seven Make-Up Artists Will Work on One Actor; Here Are Three Hairdressers, Body Make-Up Man, Beard Trimmer, Property Man and Face Make-Up Man Preparing a Subject

winkles and lines of age are green. As the camera shoots through a red filter, his hair, lips and eyebrows appear to be white, and the green lines of age in his face stand out strikingly. Now the filters, overlapped and shaded, begin to move across the camera lens. As the red filter leaves and the green passes in front of the film, the red hair becomes black, the green age lines disappear and, lo, before your very eyes age changes to youth.

Young actors are made old for the camera by intricate and skillful application of hair and grease paint. Old actors "go young" by temporary plastic surgery. This involves use of fish skin glued in front of each ear and pulled upward to smooth out flabby flesh. Then a dark shade of brown grease paint restores youthful luster to old cheeks, for youth's skin is darker than that of age.

Gray-haired German, French and Italian women, who seldom see motion pictures, contribute materially to realism ob-

tained in filming close-ups of young actors, turned gray for character parts. The hairs from those venerable heads, hairs that are cultivated for sale, are baled and shipped in 300-pound packages to the United States. Finer hair is worked into hair-lace pieces, which also are shipped to Hollywood. Later these pieces become groundwork into which human hairs of various shades are "ventilated," as the process of fixing the hair to the lace is called.

Fully half the movie stars, when made up to appear older, or to show hair over a receding hair line, wear the hair-lace pieces. Two twin brothers, Ern and Perce Westmore, members of a famous family of movie make-up artists, developed the use of hair lace to replace the old-fashioned and cumbersome wigs.

The lace is hand-made, and a tiny piece containing possibly five square inches costs \$6. The lace itself is fabricated in Europe from white human hairs, and the

a-919
218

Can be obtained from
Max Factor's Makeup Studio
POPULAR MECHANICS
666 N. Highland Ave



Hollywood
Lace

"We can add youth to nearly any face," explained Ern Westmore, as he gave a practical demonstration of temporary plastic surgery on Roscoe Ates to make the character actor's eyes droop and add fifty years to his appearance, "but it's not so easy with age. We first must have a face with the proper contour, but on the proper subject a good make-up artist can produce age ranging from youth to hoary antiquity."

He reached into a box for a long strip of fish skin, which, because transparent, has the same photographic value as human skin; produced from another a bot-

Fixed skin! 25



Removing the Natural Beard, Above, in Favor of an Artificial One: When Possible, the Artist Works from a Photograph, as Below, in Making Up

movie trick of using them consists in applying hair and making them into a hair line that looks more natural than an actor's ordinary stand of hair. Each hair fastened to a hair lace is looped, and a knot similar to a crochet knot is tied.

Actors partly bald in a few minutes may acquire a more youthful appearance by donning a hair lace. They may portray a character, take on several decades in age, adopt almost any appearance in this manner. A few years ago, wigs of hair built into silk mulling gauze, such as that used in the milling of flour, were used. But they showed abrupt hair lines, patently were false. Now the "more human" hair lace enables make-up artists to graduate the wig from luxurious growth at one point, to a very fine application that causes it to appear as though the hairs were growing out of the actor's skin. In fact, the hair lace does not register on the screen, even though a head may appear forty to sixty times larger than the original.

How and why do these changes in an actor's face make him older or younger?

He of liquid adhesive, and gathered up other bottles of talcum powder, grease paint, a ball of wax and other accoutrements. The actor sat facing three mirrors, illuminated both from the sides, the top and the bottom.

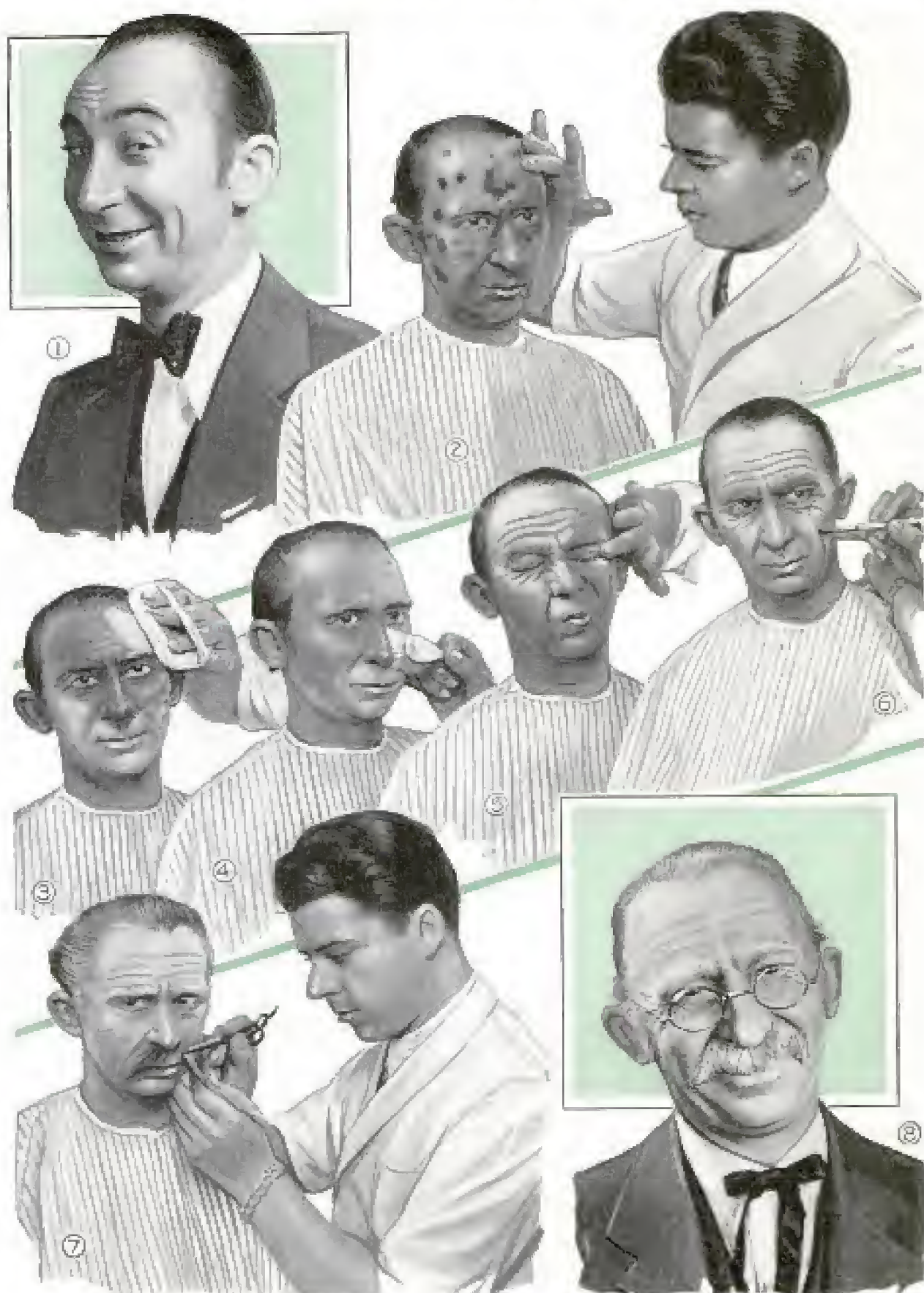
"Here," Westmore explained, "we have the same light conditions the actors will have when on the set. We can cut out any of the lights for various effects of top or side lighting. By watching the lights carefully we know exactly how the actors will appear on the film."

As he spoke he covered the actor's face with the black grease.

"In doing age," he explained, "we first cover the face with black, then with white talcum powder to get a hard surface. At this point the actor must raise his forehead and wrinkle it. While the wrinkles

liquid, drug store
hospital supply stores
synthetic material

GROWING OLD SPEEDILY—HOW YEARS ARE ADDED



Above, Left, the Actor at Thirty; Figs. 2 to 7 Show the Progressive Stages in Adding Age, and Fig. 8 Is the Finished "Product," Forty Years "Older" in About Two Hours



are up, we pat skin-shade grease paint on. Then, when he smooths his forehead again, the dark wrinkles stand out prominently. In addition, patting rather than rubbing the grease paint gives his skin a porous look which makes his facial appearance seem much older than the smooth skin of a young man."

Now the face was ready to make a few additional touches of age. Westmore pulled down the skin under the actor's eyes and gathered it under the upper end of a narrow strip of fish skin. From each eye, the fish skin passed down the wall of his face and overlapped underneath the chin. This added fifty years to his eyes in less than five minutes, but the make-up was not complete.

"The next important step," Westmore said, "is to cause his lower face muscles, his jowls, to drop. Always in preparing for that part of the make-up, the actor reads a few lines from the script so we can determine what expression he will

use most. Studying the high lights and shadows, we apply grease paint of various shades with a brush. The lighter shades give us the high lights, and the darker shades the shadows.

"Some of these lines, and the fish skin, will be covered by his beard.

"As you note, we apply the beard a hair at a time and sometimes in small clumps of thirty or forty hairs. Here again, the artificial looks more natural than the original. Suppose we were called upon to make up a white actor to resemble a Hindu. If he shaved his own beard, it would take on an artificial appearance with sharp edges. With an artificial beard we not only can shade the hairs to match perfectly, but we cut it down on the edges so perfectly that a hair line is not visible in the camera.



Above, Temporary Plastic Surgery Rolls Back Time for the Elderly Actor; Below, Wigs Are Baked in Ovens

"It is less difficult to make men appear very old than it is to add a half century to a woman's appearance," Westmore explained. "Yet we must be very careful with male make-up to avoid giving the actor an effeminate appearance. For instance, we never use artificial eyelashes on men."

a 1085 d. w. Bernard Oakes.
line coach, University
POPULAR MECHANICS 221
of Nebraska.
PADDED BAGS SERVE AS DUMMY FOOTBALL TEAM
Lincoln Nebraska



Football Players Bucking a Dummy Line Consisting of Sacks Padded around Iron Rods to Which Coil Springs Are Attached; When Struck by the Players, the Sacks Are Pushed Downward

Football players of the University of Nebraska are bucking a dummy line of padded bags that offers about as much resistance as a wall of real players might. The dummy team consists of seven canvas sacks, each padded around an iron pipe. The pipes fit in holes in the grid-iron and are on coil springs so that they bend when hit by the charging players, then spring upright again. A series of iron rods, sunk in the field and filled with plugs when not in use, enables the line coach to arrange any formation of the dummies he desires. The line machine is better than the old apparatus, which involved a framework with swinging dummies attached by ropes, since the bags do not give way before a light charge by a lineman and are never out of place. Also, the top beam of the framework often interfered with forward-pass play, and the trestles did not permit a team to run full speed through its offensive drill.

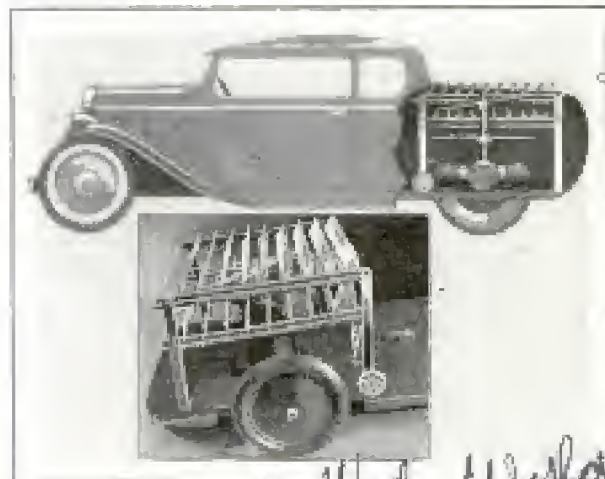
SIGNS PAINTED ON ROADS GUIDE AIR-MAIL FLYERS a 1166

Air-mail flyers, traveling across Iowa from east to west, now are guided by huge signs painted on the surface of one of the state's main highways, which approximates the path of the mail planes across this commonwealth. These markers, in yellow letters, are seventy-five feet long and eighteen feet wide, and are plainly visible to pilots at a high altitude. The guides appear a few miles apart and were painted on the highway without disrupting traffic by closing half the road

while the lettering was done and dried, then closing the other half and completing the job.

AIR IMPULSE IS HARNESSSED TO DRIVE AUTO a-1113

Two German inventors have made what they call an aeromobile which is an auto driven by an air propeller. The air screw is not installed vertically, however, but lies horizontally on the back part of the chassis. Above it are several parallel plane surfaces forming a sort of lattice-work arrangement, the angles of which can be altered. The air stream produced by the propeller breaks through these surfaces, providing the driving power. When the surfaces are perpendicular the car stops, when they lean back, it moves forward, and when they are pushed forward, the car moves backward.



Auto Driven by Propeller at Rear, Which Sends Air Stream Upward through Movable Planes

Emil Schindler and
Herbert Kohner

Wade Work

Emil George G. Harrison
218 Logan
Criminal Bluff, Iowa

Episco 4/25/31

99 99



CUMULUS



NIMBUS



STRATUS



CIRRUS

Illustrating the Four Principal Types of Cloud Formations, from Which the Weather Can Be Predicted to a Limited Extent

FORMATION OF CLOUDS SHOWS WEATHER TO BE EXPECTED

Weather can be predicted to some extent by cloud shapes and formations. There are four principal types of clouds, although frequently in the same sky may be seen combinations of the various types. Cumulus clouds are the large, white lumpy ones usually associated with calm, sunny days, while nimbus clouds are those dark ones with shiny, sunlit edges that tell of rain. Stratus clouds are the low-hanging variety that stretch entirely across the sky, and cirrus is the name applied to little feathery ones seen high in the sky on a very windy day.

ALL-BLACK OPERATING ROOMS AN AID TO SURGEONS

To offset the glare of gleaming white walls, white ceilings and equipment in hospital operating rooms, Russian hospital builders are turning to its opposite as the ideal finish for surgeries. The walls are painted a dead-black and all operating-table linen and garments worn by the surgeon and his assistants are made of

black cloth. With careful lighting, it is claimed that delicate work can be done with a minimum of eye strain. All-black operating rooms are being advocated for American hospitals by a physician who recently returned from Russia.

9105-7

ONE-MAN GARAGE SERVICE CAR

Garages that heretofore have been compelled to send two men to call for a car now can do the job with but one through the use of a motorcycle service car equipped for towing behind the automobile. The garage employee makes the trip after the car on the motorcycle, then attaches the three-wheeled vehicle to the rear bumper of the auto by means of a padded clamp and drives back to the garage. The motorcycle has a differential and brakes on all three wheels and a box body large enough for tools, parts and batteries. If a second man is needed, he can ride on the box, or it can be used to attach a spare tire or other parts. The cycle will not upset or skid, even on sharp curves.

Blackcat Dow



Motorcycle That Can Be Towed behind Auto, Enabling One Man to Call for or Deliver a Car

Herald and Examiner 5/15/31

Q. 1063

Mr. Alfonso A. Bacon before North Side Branch Chicago Medical Society

Indian Motorcycle Co., Springfield, Mass.

JUST HOW LONG WILL A SUIT OF CLOTHES WEAR?



Left. Rubbing Apparatus for Measuring the Wearing Qualities of Cloth; Right. Testing Cloth for Warmth; the Cylinder Is Heated and the Heat Escapes Only through the Cloth at Top

Whether or not that new overcoat will keep you warm, or a summer suit will keep you cool, is no longer guesswork, but a matter of scientific testing. Textile engineers and chemists now determine the wearing qualities of cloth before the material is even bought by the manufacturer, much less made into suits. Just how long a pair of trousers, or the elbow of a coat, will last is now a matter of accurate calculation in the laboratory, which also finds what the hot summer sun will do to dyes, whether a coat is rainproof, and the effects of perspiration. For the elbow-rubbing test, a piece of cloth is fastened to a board, and another piece attached to a movable arm. A small machine is started and the effect is the same as the sleeve of a coat brushing against the side of a garment. Each rub is recorded on a counter, and the results are tabulated for each kind of material. In addition to the rubbing, in testing summer materials, an acid is added that has the same effect as perspiration on the cloth. The result of a few hours on the testing machine is the same as playing tennis daily for two months with a coat made of the material

tightly buttoned about the player. Other materials are impregnated with the acid having the effect of perspiration and then tested on an apparatus which determines the force necessary to tear the cloth. An electric arc in a few hours tells whether or not sunshine will fade colors and rainproofing is indicated by applying a certain amount of moisture and determining the time required for the dampness to pass through. To determine warmth, a sample is placed tightly over the top of an electrically heated cylinder. The cylinder is insulated so all the heat must escape through the cloth. Ammeters determine the amount of heat in the cylinder and thermometers the amount escaping.

A 1006

IRON KEEPS TREES GREEN

Trees threatened with a disease called chlorosis, which produces a loss of green in the foliage, can be kept healthy by treatment with solutions of iron salts. The salts may be injected through an iron tube, inserted into the tree trunk and sealed up, or they may be placed in a narrow trench around the base of the tree.

Ans. William Zukas
4756
2212 1/2
Lafayette Ave
Brooklyn, N.Y.

Mr. Simons works for clothing manufacturers, and other cloth buyers.

1024

224

Arch. J. E. Murphy.

1052

POPULAR MECHANICS

1052 Milwaukee, Denver Colo

ROAD BUILDING IN THE CLOUDS IS HAZARDOUS TASK



Above, Carrying 1,500-Foot Air Pipeline from One Switchback Up to Next; Below, Power Shovel Excavating Road after Dynamite Blast

In a road-construction camp near the top of Mt. Evans, Colorado, the cook reached unhesitatingly into a pan of boiling water and picked up a spoon that had been left there through oversight. There was no scalding, and little or no discomfort. In itself this was an insignificant incident, but indicates the unusual, fascinating and sometimes dangerous things met with when you live and work near the 14,000-foot level. The explanation of the incident lies in the low atmospheric pressure. At 13,700 feet, where this camp was located, the air pressure is only nine pounds to the square inch, and water boils at 189 degrees Fahrenheit. Road-building jobs are pretty much the same wherever located. But this job, building the last two miles of the automobile road connecting Denver with the summit of Mt. Evans, was unusual in the matter of

living and working conditions and in the operation of construction equipment. Of the forty men who started in June, last year, only six were able to carry on without a break to the end of the season in September, and only one was entirely immune to the effects of altitude. In general, it took three men to do the work that would ordinarily be done by one man at sea level. In the mountain country, Denver, a mile above sea level, is considered the dividing point between high and low. Real altitude begins at the timber line, which is slightly under 12,000 feet. Here also begins a different world, a weird bare land of silence inhabited only by the chipmunk and the diminutive marmot and cony. The effect of the thin air on the construction equipment was fully as pronounced. The

two gas-operated shovels and the motor trucks were adjusted to an exceedingly fine spray, but even then they worked at only half their normal capacity. A dangerous thing frequently found at high altitude is the condition of electric tension called static, and the workers on the Mt. Evans road had their full share of it. Static is a condition that comes and goes, and when it is present, it is best to keep at a safe distance from all metallic objects. In one severe spell of static, the operator was knocked from one of the shovels, and three men working in the blacksmith shop were knocked down and slightly injured. Because of the danger from static, all dynamite charges were fired by fuse and cap. In one case a charge was set off prematurely when static struck a few inches of uninsulated wire at the connection with the battery box.

William Harrigan

POPULAR MECHANICS
 national Retail Drug
 TIRES AND CLOTHING FROM OIL
 CALLED NEAR IN U. S.
 225 W 34th St
 New York
 225
 all 4 5

Petroleum in a relatively short time will have applications almost undreamed of, according to an engineer speaking recently before a convention in Washington. "We may well expect petroleum to become a factor in the manufacture of furniture, as upholstery and top covering for automobiles, as insulating material for electrical apparatus, as synthetic cloth for the making of clothing, and in great demand for synthetic rubber, giving the automotive industry, for the first time, tires made from petroleum," he declared.

TAXI-COACH GIVES CAB SPEED WITH CAPACITY OF BUS

Cross a taxicab with a bus and the result is the taxi-coach, a commercial vehicle with the speed of a private automobile, and one which is handled almost as easily. The vehicle has three compartments, each with an outside door, three seats facing forward and three backward. Each seat has individual cushions. The over-all width is the same as the standard automobile's. Fares are collected from each compartment by dropping the proper coin in a slot. When change is desired, the passenger places his money in a small container similar to cash-carrying tubes in a department store. The box runs to the driver, who makes change and returns it to the passenger.



The Driver of the Taxi-Coach Sits over the Engine So He Can See the Road

Twin Coach Corp
 Kent Ohio



Three Timepieces—Two Water Clocks, Ancient and Medieval, and a Sundial

ANCIENT WATER CLOCK HELPS MAKE MODERN PAINT

Used by the Babylonians several centuries before Christ, the water clock has become essential in the manufacture of paint. It is declared the simplest means of testing ever invented. The old water clock was a cone with a tiny hole in the bottom, which, when inserted in a jar of water, was known to fill to a certain level within an hour. In its new field, the cone is inserted in varying grades of paints, the viscosities of which are measured by the length of time it takes each sample to fill the cone to a certain level.

DOORKNOBS MADE OF COTTON TO HELP THE FARMER

Efforts to find new uses for cotton, emphasized in connection with aid to southern farmers, have found results in plans for doorknobs, buttons, automobile paint, combs, movie films, writing paper, shock absorbers, wire insulators and artificial leathers made from the entire cotton plant, except the roots. Revival of cotton in its textile form of dimities and gingham, has received impetus through new markets in the form of upholstery linings, auto-tire cords, and the like.

Christian Science Monitor
 6/3/31

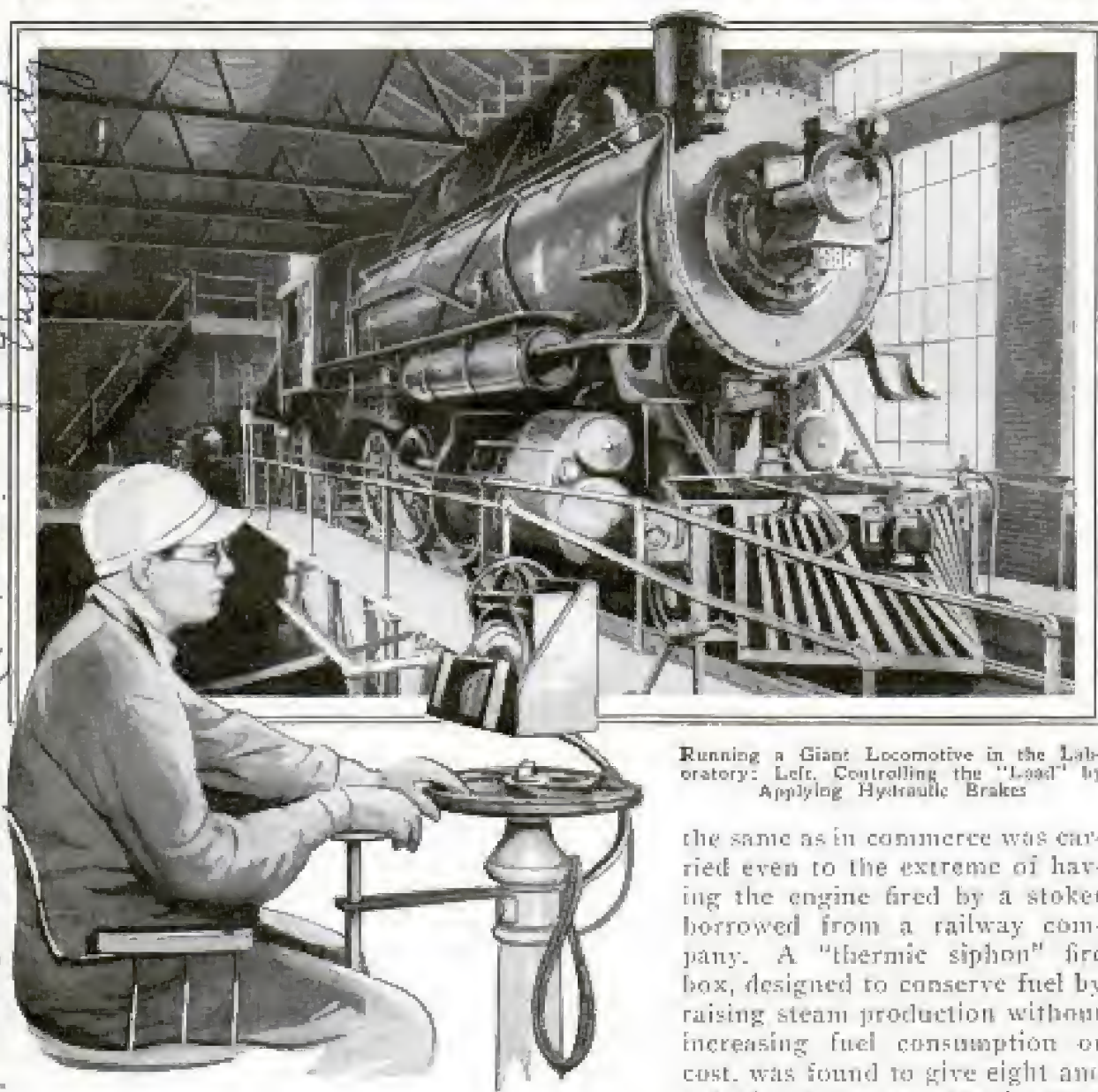
Chicago 105 W Adams

Washington Electric Mfg. Co.
 Cont.

new material etc

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226 *Bethesda Md*
 POPULAR MECHANICS
 SAVING MILLIONS YEARLY IN LOCOMOTIVE FUEL
 A 1172 Cont. Is A Stacy.
 4639 Montgomery Ave
 Prof. E. C. Schenck, Belmont
 Head Dept. of Railway
 Engineering
 Urbana Ill.



Running a Giant Locomotive in the Laboratory: Left, Controlling the "Load" by Applying Hydraulic Brakes

Moving a huge railroad locomotive from the track to the laboratory, and operating it there under conditions exactly paralleling its service in commerce, but without it traveling a mile, is a feat of research accomplished at a state university in the middle west. Knowledge that locomotive performance can be dissected and analyzed like baseball statistics was the intriguing result. Of no less importance was the discovery that American railroads can save approximately \$25,000,000 per year in fuel, enough to swing many of them from the red to the black side of the ledger, by the adoption of certain new methods tested at the school. The desire to keep conditions absolutely

the same as in commerce was carried even to the extreme of having the engine fired by a stoker borrowed from a railway company. A "thermic siphon" fire box, designed to conserve fuel by raising steam production without increasing fuel consumption or cost, was found to give eight and a half per cent average increase in efficiency. In making the test, the engine was placed on special rollers. Brakes produced the load, while the pull was measured by a hydraulic cylinder. All water was weighed, the fuel weighed and analyzed, the smoke washed and weighed, and even the cinders and ashes were weighed and analyzed after each run.

CITY OF FORTY CENTURIES AGO SHOWS LIFE OF ABRAHAM

Life in the time of Abraham has been brought to light through the excavations at Ur in Mesopotamia, carried on in behalf of the British Museum and the University of Pennsylvania. Leonard Wool-

ley, who returned recently from the scene of the digging, reports the expedition found street after street with the walls complete up to about the second floor. Abraham's contemporaries built two or three-story houses, and it was possible to see how the business of this 4,000-years-old city had been carried on by the nature of the buildings. Shops and schools were easily identified as well as private homes and public chapels. The houses were large, some of them having twenty rooms or more with private chapels attached. So well preserved are the ruins that excavators are considering compiling a city directory of the part of Ur already cleared.

HOW MANY LISTEN TO RADIO SHOWN BY GAUGE A-120

How many persons listen to any particular radio program and what type is most popular with the majority? This question, which has been a puzzle to many broadcasting stations, is being answered accurately on a system of dials and meters in one British relay station. This station supplies about 1,200 families with radio entertainment, the programs being relayed to their homes from one large receiving set. A pressure meter attached to the relay set indicates the percentage of subscribers listening in, showing when they switch their sets on and off. The reaction to the program of every subscriber is indicated on the dials.



System of Meters in One British Relay Station Which Shows Popularity of Radio Program

Dr. Sam Youles
Brighton - England



Demonstrating Permeability of New Magnetic Alloy, and, Below, Models of Atoms of This Alloy

SUPER-MAGNETIC ALLOY CUTS WASTE OF ELECTRICITY

Hailed as a product that eventually will save the electrical industry millions of dollars, a magnetic alloy of superior qualities has recently been placed on a commercial basis. It is a refined iron-nickel alloy, known as "hipernik," made by annealing the materials in an atmosphere of hydrogen at a temperature of from 1,000 to 1,300 degrees for hours to purify it. Dr. Trygve D. Yensen, of the Westinghouse Electric and Manufacturing company, who discovered hipernik, estimates that the 10,000,000 transformers that furnish power and light in the United States dissipate about 10,000,000,000 kilowatt-hours of energy as heat, and that one-half of this could be saved by the use of hipernik in the transformers.

SCHOOL TRAFFIC LIGHTS FLASH ONLY IF PUPILS ARE OUT A-1223

Traffic signals in front of one Nebraska school operate only when the children are playing or using the streets coming to and from school. The stop lights are timed by a self-winding clock inside the building and flash to protect the safety zones near the school. They are controlled by a set of disks in the clock and can be timed in any manner desired. During the school year, they skip Saturdays, Sundays and holidays.

Dr. A. A. Nichol
Oscott, Neb.

a. 849, Genl C. B. Palmer, of Boston.
Transcript, Boston, Mass

Into the Sunset



Westward Ho!—At Left Is Shown Interior of Boeing Plane with Heated and Ventilated Cabin, Hot and Cold Water, Lights, Reclining Chairs and Soundproof Walls



JUST a little over a hundred years ago, if a man wished to send a message from New York to the west, it had to be carried by a forest runner in fear of his life.

In 1869, two wood-burning locomotives halted by the shores of Great Salt Lake, bearded men in stovepipe hats descended, and a golden spike was driven into a tie,

opening the iron highway from coast to coast and reducing travel time from three months to three weeks.

Today you can fly safely and comfortably from ocean to ocean in a three-ton, fourteen-passenger Pullman of the air in twenty-eight hours. As you leave the ground, there is only an astonishing feeling of stability. Though ordinarily you may suffer from fear of heights, this does not

touch you now, for there are no lines of perspective drawing you earthward.

Your giant tri-motored car moves upward on a cushioning ramp of air. Streets, monuments, buildings are fractions of inches in size. Hedges, fences, plowed fields form ruglike patterns. Trains wind through hills with lazy deliberation. Your fellow passengers move freely about to

on Tireless Wings



Right, Pilot Wearing Radio-Equipped Helmet and Attached Microphone; Earphones Are Built Into It

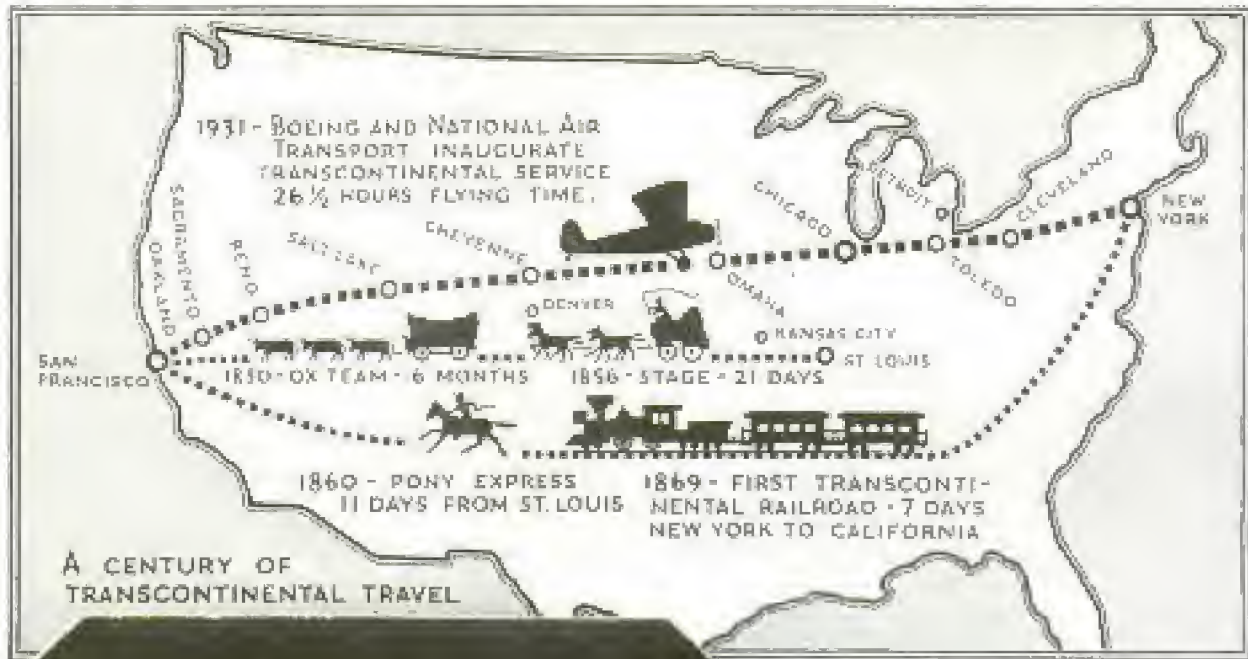
play cards, to write or to make sketches. You are hardly aware of the forward motion, though moving twice as fast as an express train.

Breakfast in New York and lunch the next afternoon in San Francisco—you can now accomplish overnight what your great-grandfather spent several tiresome months in doing. Reverently one of the passengers, a silk broker, speaks of four epochs of transportation that had touched his life. After the wagon-train days there was the Pony Express that one of the younger sons in that pioneer family rode. His own father was a surveyor for the last link of a great railroad. And here he was roaring through such a night as would have drawn the old wagons into a protective circle around a fire.

It's a big thrill to be flung across the third largest continent like a flea in a football, plucked from the earth at one sea-



board, sent hurtling straight and sure at an invisible target over the horizon, caught and sent on through the clean air in a Titan's race with the sun. One gets to know a new kind of men, a new kind of ships, a new kind of country. If they are not new, they seem so, compacted into this one swift experience. You step into a shiny United Air Lines transport from a



Courtesy Boeing Transport System
Boeing Trimotor Transport Photographed at Night; Part of the
Schedule Is Flown over Well-Lighted Airways

covered runway at Newark airport. You have just arrived in a bus so you didn't see the mechanics working around this plane an hour or more earlier, didn't look into the dispatcher's office where weather reports have been interpreted. Flying high above the earth a few minutes later, you couldn't know that several radio stations are interested in you, flashing quick, curt messages back and forth, relaying them on. A surprising number of people know where you are, and more will know as you cross invisible boundaries.

Your pilot can, in effect, see 1,500 miles ahead and know that a tractor is working in the southeast corner of the field, that the surface of a fill is still soft and that he ought to use the runway. Later on, you're going to be surprised again, say at Cheyenne, to come down out of the starlit sky, when all the world is asleep, and find that a five-course meal is just ready, the soup hot and chops nicely broiled.

Why are you surprised at all this? Because you somehow think of flying as being still in the stunt stage. You expect that sort of service on a railroad. Well, you'd also be surprised to find out how much like a railroad this airline is.

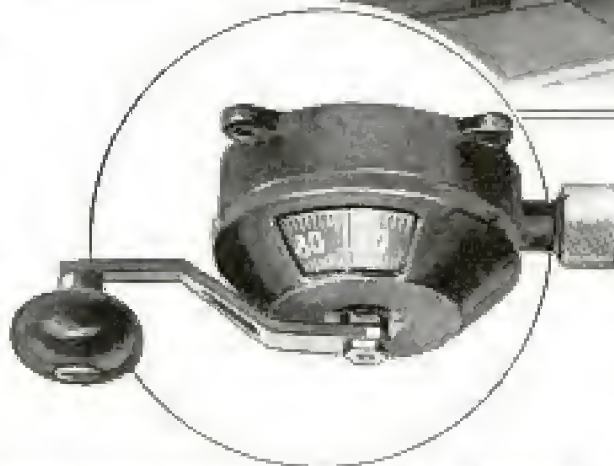
For instance, at Chicago ten or more airlines center, just as the railroads do visibly. In the waiting room passengers talk, read magazines, get something out their bags. A young man in uniform steps in and says, "Passengers for Kansas City and Dallas, please." And they pick up their topcoats and stroll down to a plane that is as ready as any train ever was to whirl them down the Mississippi valley.

And your plane, like all the others, moves on schedule time: it is an item in a time-table as intricate as that of a great rail system. Its crew is assigned, reported, on definite shifts. The plane is checked as to movements as well as operations. It goes into its lofty steel "roundhouse" after each trip for cleaning, inspection and servicing. Someone knows the hours of each engine, the craft itself, the radio set, and the pilots. Its baggage is checked through from city to terminal. It has a shiny steel cage which holds the sacks of precious mail. It has lighting system, running water—yes, even plumbing. On it meals can be served on

little tables that lock into recesses in the wall. It provides reading matter and such information as connections and facts about the country it passes over.

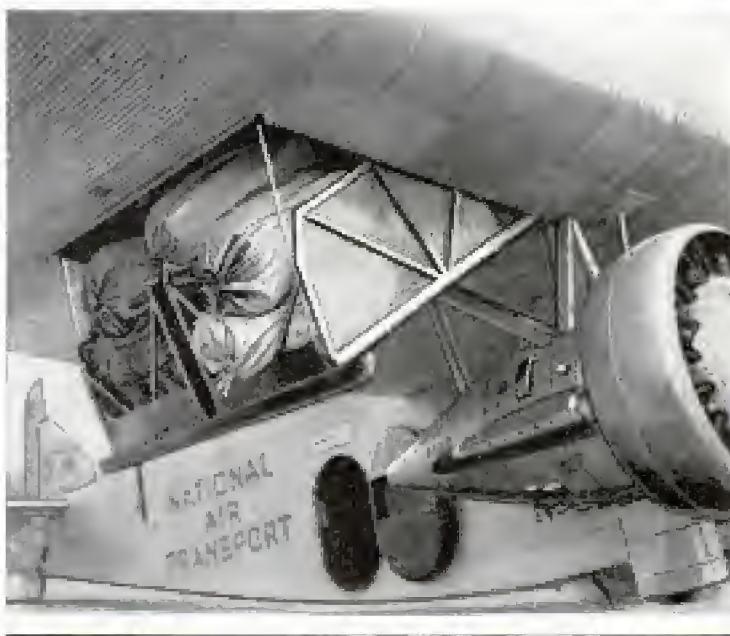
One place in which it outshines the railroads is in its communications. A really remarkable system has been worked out, in effect "a private line" of radio. West of Chicago alone are twenty-two ground stations and fifty plane installations on an exact wavelength. The sets are built tuned in. One switch, at the pilot's left hand, is all he needs. It is called expressively the "talk-listen" switch. On the ground or in the air, an operator knows he can talk and be heard by somebody immediately, without tuning, without calling. He speaks and his words go where he wants them to. And when he wants an answer, he knows it will come.

Pilot and copilot, up in the glittering cockpit of the plane, listen and talk interchangeably. A "muzzle mike" is fixed to the headphones and is ready at the mouth for a message. All the apparatus is back in the tail, remote-controlled, leaving the hands free.



Naturally one wonders how seventy stations can use one wavelength. Naturally again, it is by synchronism. A big clockface in the office at Cheyenne—

"central"—tells the chief operator when this plane or that airport will be reporting, and on the dot it comes in. Clocks are synchronized and each station has a few seconds—a very definite period—to say what it has to say and get off the air. It says an exact formula at an exact time, filling in the information at the proper place. And it is said at a speed and in a jargon that defies interpretation by a layman. It sounds like "Glpskom fropeke five sliz num esser; go ahead!" But that means a lot to the man at the desk. There is absolutely no chaff, no "how's the weather up there?" Nothing but "go ahead" ends a message to which an answer is wanted. A terse OK is acknowledgment.



Receiving Weather Reports before Take-Off, Tuner for Radio, and Disappearing Cargo Compartment in Wing



And there is no chatter between meeting pilots either. In the air, they are cool, clear-eyed young men doing their one job at a time and doing it well. However, if there is ten minutes wait or so at some field, they can be hearty, easy-going men with marvelous, sometimes ridiculous, tales to tell. If a passenger is fortunate, there may be two pilots to get yarning with each other, telling about the time they slipped down in a black night into a field and couldn't believe it themselves next morning, when they saw a snake fence surrounding them. Or about the student pilot who thought he didn't have fuel enough to get to Pasco and solemnly radioed, "If I run out of gas I'm gonna land!" They may be like the great, rotund, laughing fellow who consumes bottle after bottle of root beer. Or the slim fellow in white coveralls, head swathed in helmet, goggles and radio gear, who stands squinting through his cigaret smoke at the yellow strip that piles on the floor from a teletype machine. He has just brought his little mail ship



Getting the Latest Weather before Flight: Radio Brings Reports Once Pilots Are in the Air

through a prairie duststorm. In a minute or two, he clears for the west, becoming a red dot against noiseless lightning flashes.

Weather and radio are the twin gods of air travel. Crossing the continent now, one is in the hands of a great project of organization engineering. The new route links nineteen cities. Eight hundred beacons and blinkers mark the way, as well as the department of commerce directive radio beacon. The teletype brings the weather bureau service. And land telephone and telegraph aug-

ment all this. The trans-continental companies combined have a back-ground of 23,000,000 miles of flying. The Coast-to-Coast Limited leaves New York at nine in the morning; Oakland at 12:45 p. m. Earlier and later planes cover the same routes on different schedules, but not connecting at Chicago. A complete map of affiliations and connections makes a web of lines over the whole United States, reducing travel time from point to point to something like a third of that required by any other method.

LANTERN PROJECTS BOOKS AS WELL AS SLIDES

Intended particularly for classrooms, a four-purpose lantern projects any opaque material and can be used for showing postcards, charts, drawings, pages from books and the usual glass slides, film slides and microscope slides. Should occasion demand, the several types of illustration can be used in one lecture, as it is a simple matter to change from one to the other. The lantern accommodates a book of nearly any size, projecting a six-inch square area at one time.



Lantern Which Projects Any Opaque Material, Throwing Image of Paper Chart on a Screen



Up and Over; Center Span of Lake Union Bridge at Seattle, Which Is Nearing Completion, Shortening Route into City

HUGE BRIDGE LINKS SEATTLE TO PACIFIC HIGHWAY

Commuting time will be reduced materially when engineers open the new \$1,500,000 bridge across an arm of Lake Union near Seattle's business district, shortening the route over the Pacific highway into the city. The bridge has a clearance of over 150 feet to allow passage of ships.

SMOKE GAUGE INSIDE FURNACE SHOWS FAULTY FIRING

A simple form of smoke gauge now offers the fireman of a furnace a continuous picture of smoke conditions inside the furnace. The instrument consists of a projector throwing a beam of light across a smoke passage to an indicator opposite. Its center portion is a shadow screen on which the beam is thrown. Smoke particles in the beam cast shadows on this screen. Around it are illuminated sectors, graduated in a scale of smoke densities with which the shadows are compared.

The Sales Corp. Richmond

all 48

Chicago S. S. Wabash

Eastern Bell Telephone Co. 3620 Chrysler Bldg New York

Spencer & Co. 19-20 Bond St. N. Y. C. 100

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Cont. Es. H. Eckhardt
4528 Walnut St

Christian Science
Monitor 6/2/31

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a 1147

POPULAR MECHANICS

Julia



Man Using One Eye to Match Colors in Test Which Helps Show His Mental Balance

COLOR-MATCHING TEST SHOWS YOUR CHARACTER

Color sense, the ability to match various tints of colors, has been found to have a definite relation to character, since it indicates mental balance. Dr. William S. Wadsworth, coroner's physician of Philadelphia, has evolved a color test to gauge a man's mental make-up and show whether or not he is capable of certain acts. From the results of such tests, he claims, it is possible to determine whether an individual is mentally well-ordered, whether he is whimsical and, aside from showing possible criminal tendencies, demonstrate also if he is fit to be put in a position of trust upon which the lives and safety of others may depend. The equipment consists of a blackboard on which are pasted ten colored slips of paper with a small box back of each slip. The person taking the test is handed a package of 100 slips of tinted paper and asked to place in the receptacle the tints most nearly matching the sample in front of each. After the test, the papers are pasted on a large chart, each near the sample with which the person associated it. Provided the individual is not color-blind, he would be classed as whimsical, unstable and unreliable if he placed orange tints near greens and blues near yellows. The combinations may reveal a hysterical streak in another individual, and from the method he uses in sorting the colors, his mode of life can be determined to some

extent. Some artists and painters taking the tests have shown a queer color sense, and one etcher who works in blacks and whites was found to be color-blind.

PEE-WEE FURNITURE FOLDS UP INTO TRICK SHAPES

a 1244

Trick furniture, much of it small to compare with the size of the modern apartment, was shown recently at a furniture exhibition at Chicago. Reclining chairs with trick arms, living-room sofas upholstered in white cloth that is removable and washable, and tables that fold into any number of shapes and sizes were among the exhibits. A three-cushioned davenport, for instance, is made into a comfortable bed by merely switching the cushions around. A long console table by day is doubled in width for the evening meal. Combinations also were shown whereby a desk can be bought today, a radio tomorrow and a bookcase a week or so later, all the same style and all fitting together to make one piece.

TWO MEN DO WORK OF SEVEN BY USING AIR CLAMP

a 1192

Invented by their own foreman, an air clamp has been adopted by manufacturers of upholstered furniture in a Los Angeles plant, enabling two men to do the work of seven. The clamp puts the whole furniture frame together in one operation, with one man gluing the pieces and the other operating the tool.



Air Clamp by Means of Which an Entire Furniture Frame May Be Put Together in One Operation

done by M. C. Anderson
Foreman, Brown, Saltman
Copyrighted material

Upholstery Co., Los Angeles, Calif.

Q1055

see Feb 1931 203

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Kiel Fu
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Demonstrating the Transmission of Noiseless Power from a Model Station by Use of Grid-Glow Tubes Which Can Change Alternating Current to Direct Current or Reverse the Process

NOISELESS POWER IS OFFERED BY GRID-GLOW TUBE

Noiseless power stations without any moving parts for transmitting electric current over long distances are a possibility as the result of the development of the principles incorporated in the ordinary grid-glow radio tube. A Westinghouse research engineer recently demonstrated the transmission of noiseless power from a model station by the use of such tubes, which are capable of changing alternating current to direct current at relatively high voltages for transmission to a distance, then transforming the direct current to alternating current for local distribution. For years electrical engineers have dreamed of transmitting large

amounts of power by direct current while generating it with ordinary alternating-current equipment. In the past the difficulty has been to make satisfactory equipment for producing the necessary high-voltage direct current for the transmission line and the changing of this direct current to low voltage, either direct or alternating, for local use. It is now believed the grid-glow tubes may be employed in direct-current districts of cities to make ordinary radio sets, refrigerators and other electrical equipment directly available without using special equipment or a small power-plant set. If radio power should ever become a reality, the tubes are expected to play a large part in changing high-frequency current coming over the air to commercial frequencies.

Q1193

TIRE CHANGING BECOMES EASY WITH "COMPLETE" TOOL

Tire changing is made a quick, clean and easy job with a tool recently marketed, according to its makers. It is a combination iron and spreader, the handle of which is iron, with a thin tapered end of heat-treated steel made to stand much abuse. The curved end is a tire spreader that can be used in place of the hands to inspect the inside of



the tire and locate trouble. The tool has enough leverage to spread the tire and replace tube with very little effort.

"MIRACLE" SAUCE ON ICE CREAM RELIEVES STOMACH ILLS

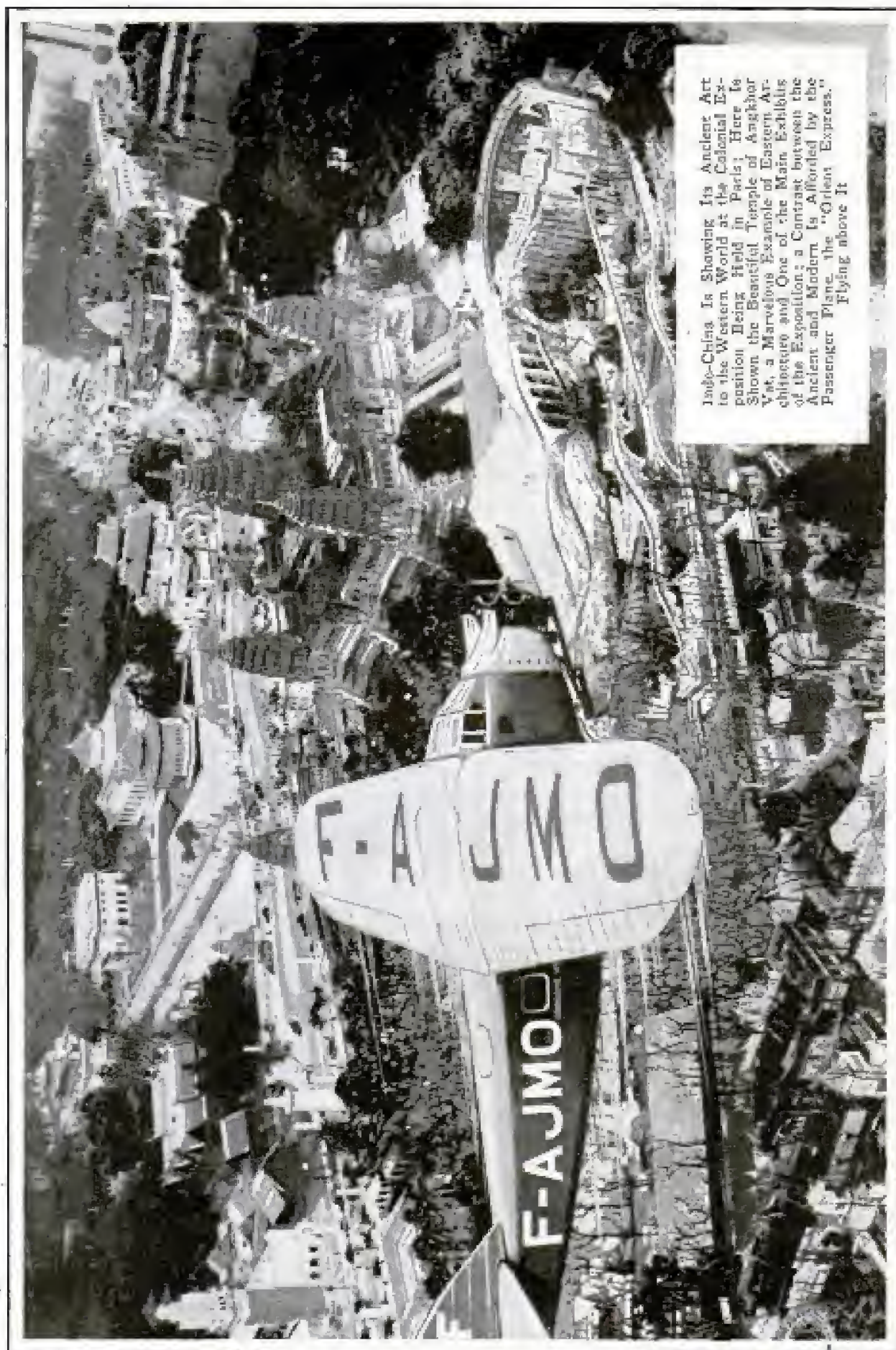
Relief from certain forms of stomach ills is promised as the result of research at the Northwestern University medical school, where neutral gastric mucin, obtained from the gastric membranes of swine, has been mixed with foods, with curative results. The substance is mixed with malted milk, fruit juices, or as a sauce for ice cream and is said to have given sufferers from stomach ulcers relief in very short periods.

Snow. Craggs Corp
1800 S. Dearborn
Chicago

Sold by Clean & Rogers S.
Cutter not on market
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Q1247
Chicago Ave 7
Chicago

21049



Indo-China Is Showing Its Ancient Art to the Western World at the Colonial Exposition Being Held in Paris; Here is Shown the Beautiful Temple of Angkor Wat, a Marvellous Example of Eastern Architecture and One of the Main Exhibits of the Exposition; a Contrast between the Ancient and Modern is Afforded by the Passenger Plane, the "Orient Express," Flying above It

A COLONIAL EMPIRE MOVED TO WALLS OF PARIS



Above. General View of Some of the More Important Buildings of the Colonial Exposition; Right. Decorative Figure from the Belgian Congo



France Is Seeing Her Colonial Empire Moved Up to the Walls of Paris in This Great Exposition; Above Is Shown a Part of the Pavilion of a Building from the Dutch Indies



Below, a Group of Merchants in Native Costume Enjoying a Siesta in Front of the Tunis Pavilion

INDO-CHINA SHOWS ITS ART TO WESTERN WORLD



At the Left Is an Illuminated Fountain of Modernistic Design, and Above May Be Seen a Group of Indians in Blankets and Feathered Bonnets Arriving from America for the Exposition



In Circle, Group of Elephants from One of the French Colonies on Their Way to the Zoological Gardens to Be Quarantined; Below, View of the Illuminated Temple of Angkor Wat

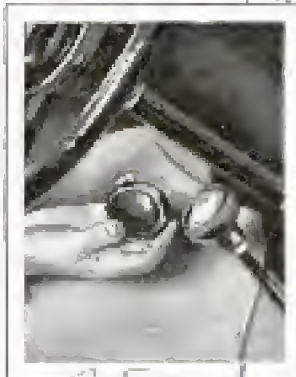


ELECTRIC EYE AIDS IN FOLDING PAPER NAPKINS EVENLY

One manufacturer of paper napkins has placed an electric eye, or photoelectric cell, on guard to see that the machine which folds the flimsy pieces of paper does the job right. The paper is fed from rolls to machines which emboss, fold and cut it, but heretofore it has been difficult to keep the paper in the correct position so the napkins would be folded evenly. Recently a relay, sensitive to light, was set to keep watch on the tissue as it passes through the folder. By means of signal lights, it warns operators to change the position of the paper when it is not right. An electric light shines on the paper and below the paper are two photoelectric tubes so arranged that a decrease of light actuates one and an increase actuates the other. One is placed a bit to one side of the paper, and the other is under the tissue, so that, regardless of the error in position, one light or the other signals a warning.

HOLLOW KNOB ON GEAR SHIFT HOLDS KEYS OR PAPERS

Room for extra keys, license and registration papers is provided in the hollow knob now being made for attachment to the gear-shift levers of standard automobiles. The knob screws into place exactly as



the ordinary one and has much the same weight and "feel." Unscrewing the cap of the knob reveals a snug cavity large enough to hold several articles.



Section of Model Village Fronting on Stadium Track, Built for Athletic Stars Entering the Olympic Games

SIXTY-DAY MODEL VILLAGE TO HOUSE WORLD STARS

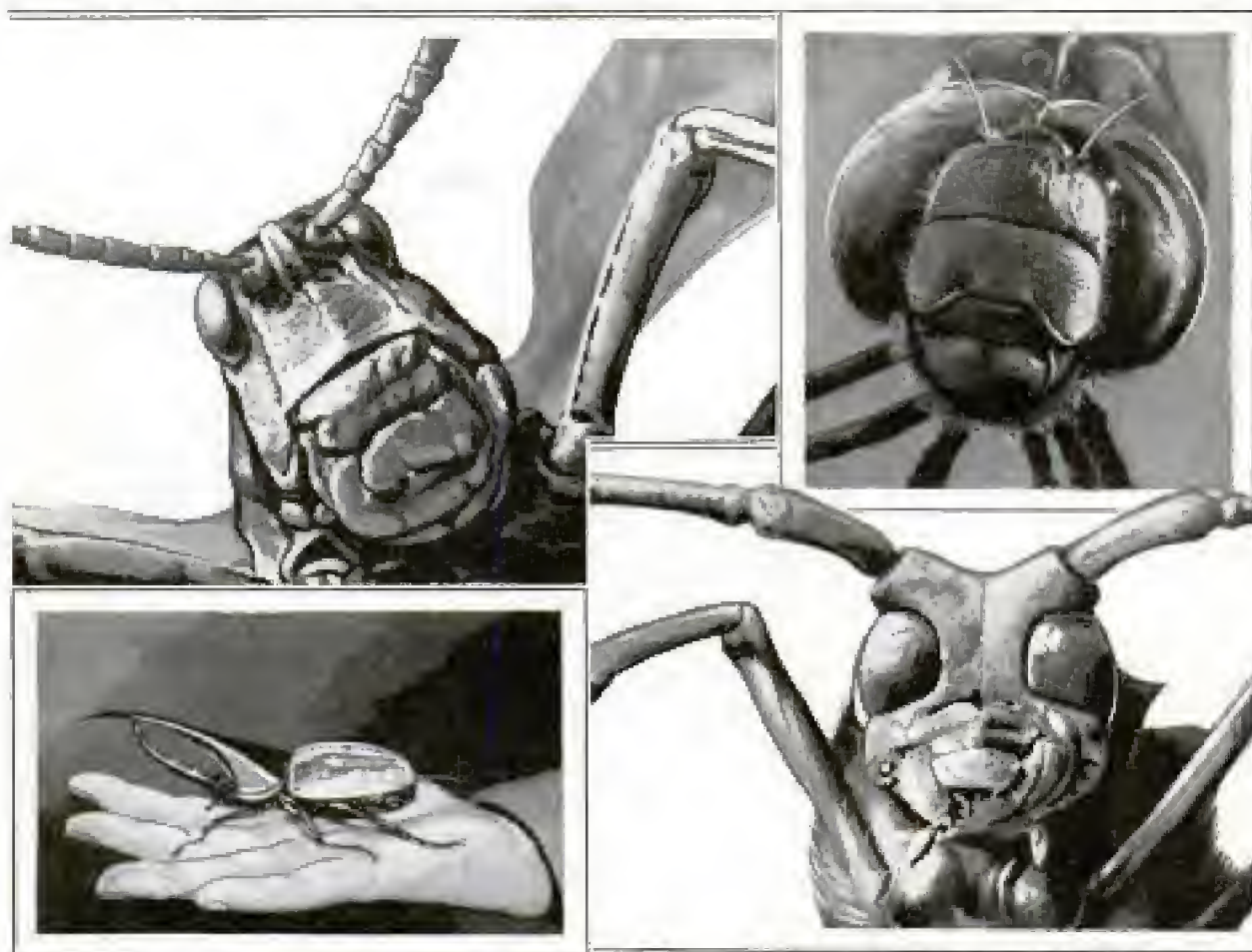
Between 600 and 800 individual dwellings, each with two rooms and a bath, are being constructed in Los Angeles to form the "Olympic Village," housing international sports stars at the 1932 Olympic games. Each house will be designed in the character of the nation its occupants will represent, with correct furniture and community dining rooms and kitchens for each division, so the athletes will receive the home atmosphere and cooking to which they are accustomed. The houses will stand only sixty days, when they will be sold for summer cottages. Each has an inside shower bath, four specially constructed six-foot beds, and attached to each wall is a washbowl with running water. Furnishings include wicker chairs, tables and rugs. The village system will be for men only, the women athletes being housed at the University of Southern California, near the stadium.

☛The Chicago district builds more railroad cars than any other area in the world.

Electrocraft Corp.
161 Massachusetts Ave. Boston, Mass.
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Rev. A. Paulson Lem Knob

SOME QUEER FACES FOUND IN THE INSECT WORLD



Top, Left, Grasshopper's Mouth Is Below Its Chin; Right, Head of the Cannibal Dragonfly; Lower Left, Great Horned Hercules, and Lower Right, the Studios Batocera Beetle of Japan

Ranging from a smirking amiability to an expression of gloating frightfulness, features to be seen on the countless inhabitants of the insect world are believed to have been supplied by old Mother Nature to protect her offspring. While the grasshopper, for instance, has lines in his

face which look like a mouth, actually his mouth is below the chin. He might be classed as a "highbrow" with his unusually long forehead. The common dragonfly or "darning needle" is all eyes and whiskers, and while it looks harmless, there is no greater destroyer of fellow insects.

SINGER MUST "SEE" TONE PITCH TO BE GREAT TESTS SHOW

Great singing voices are due to the singer's mental and emotional perception and not solely to bodily ability, hundreds of tests on trained and untrained voices by acoustical experts have shown. A mental "picture" of the pitch he is about to sound is vastly more important to the singer than a "cathedral throat," it is declared. Though the speaking voice may be trained into near-perfection, if the mental concept is faulty, the pupil cannot be taught to sing. Many new ideas as to breath

control and sound production have been put forward as the result of these tests, which were conducted with the aid of New York University and the Bell Telephone laboratories. For instance, it was discovered great singers never produce a "dead" tone except when singing very softly. As the intensity increases, the tone fluctuates, and at very high intensities, even the pitch varies. This produces the "vibrato," which actually is a sort of "stop and go," that is, the singer sings and stops singing, but the frequency is so great the result to the human ear is the "trill" or vibrato.

Douglas Stanley reported to Engineering Foundation, 29 W. 39 St. New York

A. 273. Weather Bureau:
Washington, D.C.

Active Manufacturers
220 W. 4th St.
New York

POPULAR MECHANICS

A. 1214

AIR SPEED GAUGED BY CLOUDS AS AN AID TO FLYERS

Clouds are being utilized by the weather bureau as wind gauges for aviators. A cloud travels with the wind and makes visible the speed of the wind at a certain altitude. The bureau has devised an apparatus by which observers can determine just how fast a cloud is moving. The cloud is sighted in a mirror mounted on a frame graduated in degrees. One factor for the computation is obtained by observing the image of the cloud as reflected by the mirror for a period of time. The second factor needed is the cloud's distance from the earth which is determined by sending aloft a standard "ceiling" balloon and timing its ascent.

STAMP PAD LIKE TYPEWRITER INKS FROM RIBBON

Stamp pads with ribbon surfaces instead of felt, giving long service and assuring the user of even inking throughout the life of the pad, have been placed on the market. The ribbon is much like that used in a typewriter and is wound from end to end of the pad with finger screws, so that when the inking surface becomes dim a few turns will give the



Stamp Pad with Renewable Ribbon That Inks Like That of a Typewriter

user a new one. The ribbon, when used up, is replaceable.

Life Long Stamp Pad
Co., 230 W. Superior St.
Chicago



Specimens of Large Stone Spheres That Have Been Formed by Nature in Utah; They Are Known Locally as "Goliath's Golf Balls"

GIANT "GOLF BALLS" OF STONE FORMED BY NATURE

Nature apparently was in a playful mood when she created some of the formations in Manti national forest, Utah. Among the most unusual specimens are scores of almost perfectly round hard-stone balls found in the soft sandstone strata, some of them two or three feet in diameter. They are known as "Goliath's golf balls," and scientists are studying them in an effort to explain their origin.

RAINBOW HUES FOR RAIL CARS

Coaches in color schemes to suit every mood of passengers have been introduced by an English railroad. The "Spectrum special," as officials of the line call it, has six cars, ranging in color from violet to crimson, and is operated between a suburb and the heart of London. After a year's test, the most popular color will be adopted for the whole train.

LAMP DETECTS FAULTY GLASS

Defective glassware now can be detected before it leaves the factory by tests with a light which shows up the faults. The lamp produces polarized light which reveals the defects in the glass.

Libby Owens Ionia
Island Co. Ionia Mich
Detroit Mich

Kansas City Star 6/7/31

A. 1122

A. 1317

A. 1250

Do not use. It is the best of the kind.

2025 Higher and
better. New

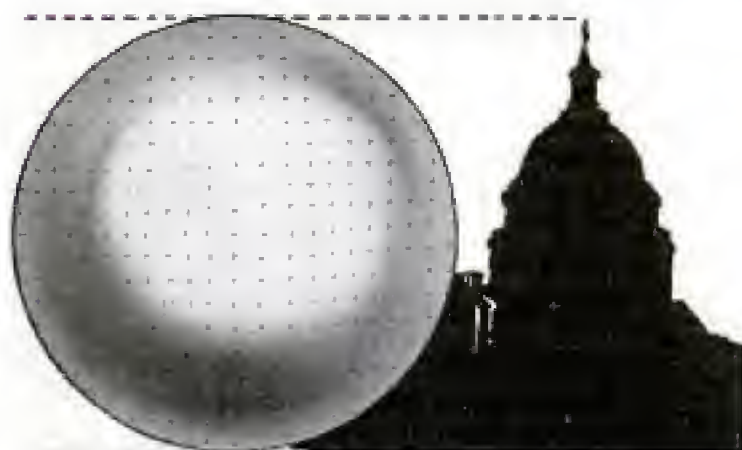
Ant. Is. H. Macy, 4689 Montgomery Ave Bethesda, Md.

Solving the Greatest



PERIODIC CHART OF THE ELEMENTS															
THE ATOM															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
H	He														
Li	Be	B	C	N	O	F	Ne								
Na	Mg	Al	Si	P	S	Cl	Ar								
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po
Fr	Ra	Ac	Th	Pa	U										

What the Finding of Element No. 85 Means to You



If the Atom Were as Large as the Nation's Capitol, Each Electron Would Be the Size of a Bullet

MARKING a new epoch in human achievement, the end of a 2,000-year search, comes the announcement of the success of Dr. Fred Allison, of the Alabama Polytechnic Institute, in isolating the last of the ninety-two chemical elements, the foundation stones of the universe, No. 85—eka-iodine.

And what does that mean to you—a new triumph for chemistry which, in its role in the life of man, surpasses the pow-

er of kings. Today there are more than a million workers in American plants dependent on the chemical engineer for translating the results of such research into new and profitable enterprises and products. Chemical industries now produce at least one-half the manufactured wealth of the United States.

Ten years ago, for instance, it was believed impossible to make wire cloth with meshes finer than 100 to the square inch. Today an American company, aided by chemistry, can supply metal cloth in which there are one million microscopic openings in one and one-half inches. Although made of metal, its silky threads are as soft to the touch as the sheerest silk. Indeed, it is now possible to weave non-rusting metallic stockings—at a fabulous cost, of course—which no naked eye could distinguish as metal.

Enduring and beautiful vases from cheese, furniture from carbolic acid, cloth-

see July 1931

Newark Wire Cloth Co
Newark, N.J.

Copyrighted material

Chemical Mystery

ing from crude oil, and vast numbers of new products from corn-cobs, are some of the facts of the present generation. The variety and quality of these artificial substances is something to conjure with. Modern plastics may be compared to new metal alloys. It is now possible to produce almost every article of commerce



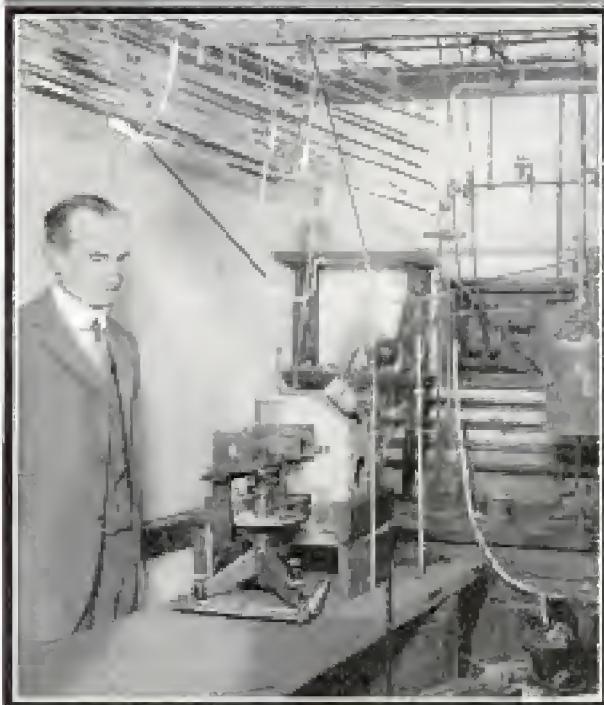
Dr. Fred Allison, Who with Magneto-Optic Method, Found the Last Elements 87 and 85; at Left, the Spectroscope

that in use will not be subjected to temperatures higher than twice the boiling point of water.

Today the manufacture of synthetic plastics is a \$250,000,000 industry. Three hundred and fifty different plastic materials are employed to make innumerable things, ranging from a toothbrush

handle to inkstands, lighting fixtures, abrasive gears, furniture and clock cases. As plastics become lower in price, they will begin to compete with such standard materials as glass, steel and iron. The essential for bringing this change about is a cheapening of raw materials. Chemists have recently shown that methanol can be made from carbon dioxide and water. In this reaction they have the key to unlock a vast quantity of materials, and it is also possible to synthesize ammonia from nitrogen and hydrogen, one derived from air and the other from water. Hence, plastics are literally made out of the sky and the sea.

When the raw materials for plastics are cheaper, a great revolution may junk many of our prevailing manufacturing methods. Chemical engineers foresee plastic automobile bodies, molded in a single piece and in a single operation, and mold-



Prof. E. Smith Hopkins and Experimental Equipment with Which He Discovered Ilinium

How of all things

*Cyanamid Co. New York
535 5th Ave.
American*

Q. 1244

Dr. L. Charles Sperry
Chemist, 101 Park
Are useful

Dr. Buckner Egloff

Dec. 1900

See

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Fruits and Vegetables Are Ripened Artificially with Ethylene Gas While the Onlooker Watches the Process

mospheric moisture, and corrosion-resisting tantalum for laboratories where strong acids are used.

The magician called the chemical engineer is especially active in the rubber, petroleum, cosmetics and wood-pulp industries. Chemistry has obtained a revolution in the newsprint industry. The forest service has successfully manufactured white paper from the pulp of the young slash pine, the yellow pine of the south. Heretofore

ed airplanes. In the field of home and office furniture, the plastic chemist will reign supreme. Architects will specify plastics for the interior trimmings of homes and buildings.

In combination with rustless alloys and non-shatterable glass, it will be possible to construct a whole building out of materials, none of which is found as such in nature. A synthetic flexible glass that can be molded and bent without breaking is now available. It is made from sulphur, ammonia and cyanide, waste products of illuminating gas. Among other new materials are asbestos wall tile for bathrooms, kitchens and restaurants; asbestos rock cork for insulating purposes; waterproof airtight cloth bags designed for shipping chemicals attacked by at-

slash pine, loblolly pine, short-leaf pine and long-leaf pine, all growing in the south, were considered worthless for newsprint because they were thought to contain too much resin.

It would require 300 years to restore some of the wood we are using in the paper industry, but newsprint can now be made out of wood that can be cultivated almost like corn and potatoes. Another sensational revelation is the making of synthetic rubber out of petroleum.

The old dogma that oil and water do not mix also has been exploded by the chemist. By subdividing the oil into tiny droplets and enveloping them in a film of emulsifying agent, oil and water can remain in partnership indefinitely. By doing the "impossible," the chemist was

Benj. S. Brooks, Chemist
114 E 32nd St, New York

The Foundations of the Universe

1 Hydrogen	20 Calcium	39 Yttrium	57 Lanthanum	75 Rhenium
2 Helium	21 Scandium	40 Zirconium	58 Cerium	76 Osmium
3 Lithium	22 Titanium	41 Columbium	59 Praseodymium	77 Iridium
4 Beryllium	23 Vanadium	42 Molybdenum	60 Neodymium	78 Platinum
5 Boron	24 Chromium	43 Manganese	61 Promethium	79 Gold
6 Carbon	25 Manganese	44 Ruthenium	62 Samarium	80 Mercury
7 Nitrogen	26 Iron	45 Rhodium	63 Europium	81 Thallium
8 Oxygen	27 Cobalt	46 Palladium	64 Gadolinium	82 Lead
9 Fluorine	28 Nickel	47 Silver	65 Terbium	83 Bismuth
10 Neon	29 Copper	48 Cadmium	66 Dysprosium	84 Polonium
11 Sodium	30 Zinc	49 Indium	67 Holmium	85 EKA-100 (E)
12 Magnesium	31 Gallium	50 Tin	68 Erbium	86 Radium
13 Aluminum	32 Germanium	51 Antimony	69 Thulium	87 Eka-Cadmium
14 Silicon	33 Arsenic	52 Tellurium	70 Ytterbium	88 Radium
15 Phosphorus	34 Selenium	53 Iodine	71 Lutetium	89 Actinium
16 Sulphur	35 Bromine	54 Xenon	72 Hafnium	90 Thorium
17 Chlorine	36 Krypton	55 Cesium	73 Tantalum	91 Protactinium
18 Argon	37 Rubidium	56 Barium	74 Tungsten	92 Uranium
19 Potassium	38 Strontium			

6/26/960

able to produce new and better polishes, cleansers, cosmetic creams, insecticides, disinfectants, deodorants, flavors and countless other useful products to benefit mankind.

Ancient alchemists believed the earth and its gases were made up of four things—earth, fire, water and air. But the modern chemist builds with ninety-two elements. For all things he goes back to the atom—a bit of matter so small that there are billions of them in a bubble of gas no bigger than the letter "o," while an electron is a thousand times smaller than the smallest atom.

Atoms may be compared to the letters of the alphabet which can be put together in innumerable ways to form words. So the atoms are combined in equal variety to form what are called molecules. Thus the association of words into sentences is like the combination of molecules to form materials. Each atom is like a miniature solar system. There is a nucleus, or sun, and around it are the planets, or electrons.



Think of nature as a builder, making all that we see out of atoms of ninety-two different kinds, just as the builder of a house constructs it of bricks, slate and glass. The atomic table places atoms in regard to their weight, starting with the lightest, hydrogen. This table is comparable to the keyboard of a piano. Some places in it were long vacant, but have now

all been filled by Doctor Allison's discovery of element 85 in sea water, fluorite, apatite, monazite sand and in potassium bromide. Less than two years ago he discovered element 87.

The scientist employed the magneto-optic method which enabled him to detect one part of substance in 100 billions.

Until the discovery of illinium by Prof. B. S. Hopkins, of the University of Illinois, in 1926, no American investigator had ever been on the greatest honor roll of chemistry. But it is noteworthy that the last three elements needed to complete the chemical structure of the universe were discovered by Americans.

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First Rubber from Oil, Airtight Bags for Shipping Chemicals, and Broadcasting Color

a. 1285

Developed by H. S. McQuinn



Roulette on a Large Scale and Golf on a Miniature One Are Combined in This Game, in Which a Golf Ball Replaces That of Roulette

GOLF AND ROULETTE COMBINED IN FASCINATING GAME

Roulette golf is the latest form of miniature sport to be introduced on the Pacific coast. The game consists of a giant roulette wheel and a tee from which a golf ball is driven into the bowl surrounding the wheel. The ball spins around the bowl just like the small one does in the conventional roulette outfit. Features of both games are combined in scoring.

FLYER ESCAPES VOLCANO

Flying for the first time over the Aniakchak volcano in Alaska, twenty-one miles in circumference, a plane, piloted by Harry Blunt and carrying a mechanic and a passenger, was sucked by the hot gases into the crater. The plane was pulled insistently toward the pit, and only by a sudden dive away from the hot mouth, did the pilot save the ship from plunging in. Sulphur fumes were noticeable forty miles from the pit and at more than 6,000 feet in the air, the flyers reported.

AGES OF ROCKS ARE DISCLOSED BY ACID TREATMENT

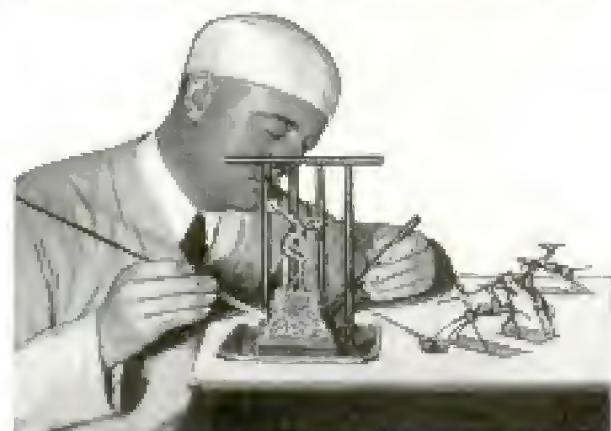
Rocks that, when dug out of the ground, cannot be told apart, give up their ages and other secrets when they

are subjected to acid treatment and the residue is examined under a microscope, it has been discovered by state experts in the Missouri bureau of geology and mines. It was found that specimens taken from deep wells all looked alike, although it was believed that layers at varying depths represented different geologic ages. Deciding the limestone matrix of the rock was what made the specimens resemble each other, the limy substances were dissolved and the fossils, which are the usual dating tags in geological research, were found in the

residue, untouched by the acid. The method is of value to such undertakings as mining, oil prospecting and deep drilling.

WONDER TROPHY OF GLASS IS MADE FOR OLYMPICS

Three weeks' steady work by R. J. Manley, a Venice, Calif., glass blower, has resulted in the completion of a glass replica of "The Discus Thrower." It has been presented to the Olympic committee. Set



R. J. Manley, of Venice, Calif., Putting the Finishing Touches on His Glass Statue

on a reflecting base, the figure is of crystal with a background of four black Grecian columns. It represents Manley's ninth effort to complete so large a figure.

Carlo Golf Course
6th and Vermont
Los Angeles, Calif.
(Monte)
my

Rev. Bernard
Hyland, Calif.
a. 1285
a. 1304

Science News Letter
6/13/31

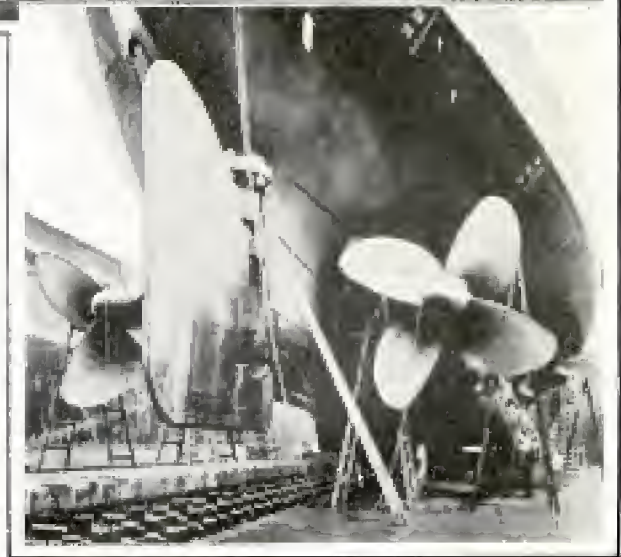
are being analyzed by H. S. McQuinn. A note: geologists

QUEEN OF WHITE FLYERS SETS NEW FUEL RECORD



"Empress of Britain," New Queen of the Canadian Pacific's Fleet of Atlantic Liners

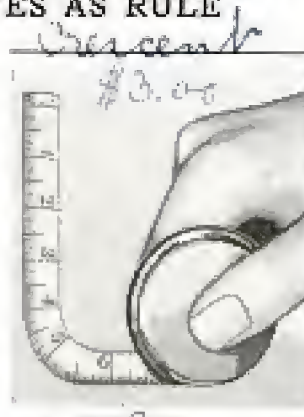
"She's curra savin' on fuel," say her Scotch builders proudly, and claim for the new "Empress of Britain" a record for fuel economy at sea. But oil buyers for the owners, the Canadian Pacific railway, explain it as "maximum efficiency" in the high-pressure boilers of the black-long, sixteen-story high, white flyer, that has just become the new queen of a white fleet of oil burners on two oceans. The record now held by the "Empress of Britain" was established by seven consecutive days of trials at full express speed. The previous record was made by the "Empress of Japan," which holds every speed mark for the Pacific ocean. The record is credited to the new Johnson boilers, designed by the company's superintendent engineer. These boilers generate double the amount of steam of any other type. There are nine of these boilers, driving four propellers almost twenty



feet in diameter. There are two smaller boilers, also, for domestic uses on the ship. Modern oil-burning machinery eliminates, even at thirty miles an hour, the romantic but dirt-distributing smoke plumes that used to pour from a liner's funnels. Also, the new cruiser's bow and stern "iron out" the water.

91124 SPRING-WIND STEEL TAPELINE ALSO SERVES AS RULE

All the convenience of a pocket tape and the utility of a rule are combined in one six-foot measure in the form of a steel tapeline contained in a metal case equipped with a spring-winding attachment. This



tape gives the rigidity of a rule, but winds into a case only two inches in diameter. It can be obtained marked in inches to sixteenths, or in feet from tenths to hundredths like an engineer's measure. It has a ratchet stop and may be projected unsupported to any length or flexed to measure circular or round-cornered objects.

¶We want all our readers to write us freely and often whenever they wish additional information on articles published in this magazine. Address Bureau of Information, Popular Mechanics, Chicago.

Lufkin Rule Co.
 Saginaw, Mich.

a1096 Cmt. Wilbert Edwards
1518 Earl St.
Tyler, Texas

The CONQUEST OF

ONE of the most spectacular oil-well fires ever known was the blazing Sinclair No. 1 Cole well in the center of the great new east Texas field, which took a toll of nine lives and roared defiance almost 200 hours to all efforts to conquer it.

Like a bolt from the blue, the stream of liquid gold which had been gushing uncontrollably from the earth for more than thirty hours was changed into a flaming geyser. The clash of steel tools caused a flash which ignited the gas-laden stream with a terrific blast that knocked workmen from their feet and enveloped them instantaneously with death.

It happened about five o'clock in the afternoon, during change of shifts. A double crew was on the derrick floor,

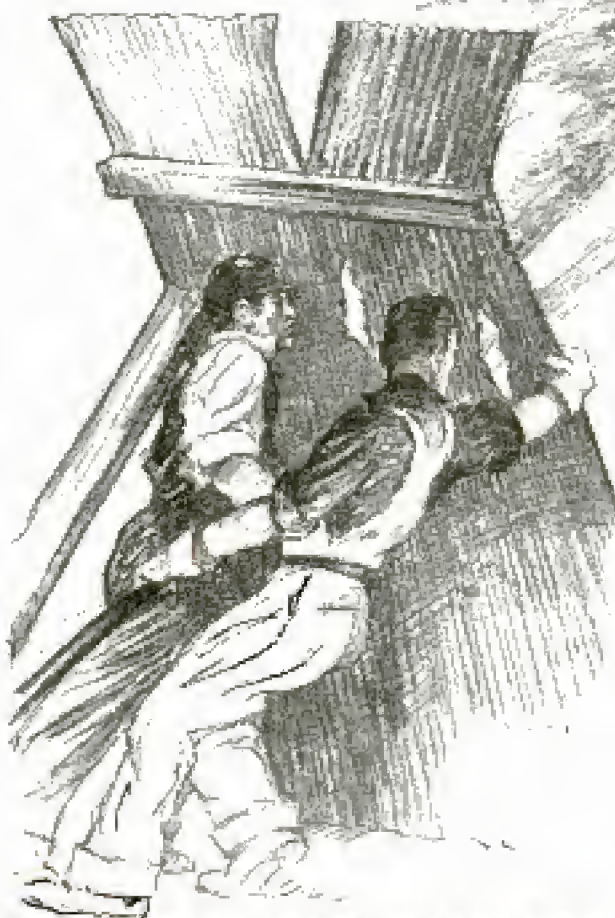


and equipment was being moved into place for completing the task of controlling the well. Only two minutes more and the job would have been done. And then...

But hear the story from the lips of an eye witness, a few days before his death from burns.

"I was standing about halfway between the edge of the derrick and the hole. Suddenly the elevators fell. The burst of flame was immediate. The falling elevator must have caused a spark that set fire to the oil and gas fumes. I started to run. I found my clothes on fire. I rolled on the ground to put out the fire, but that did no good. I had on only a shirt and trousers. I got out of my shirt, and another fellow helped me get out of my trousers."

Some of the ten or twelve who were on the derrick floor ran through the woods screaming for help. The owner of the land on which the well was located and two or three others were standing outside the reach of the flames when the explosion came and grabbed the victims as



Workmen Approaching the Fire behind Metal Shields, While Others Spray Them with Water



An Airplane Engine Mounted on a Truck Blew a Blast of Air against the Inferno, While Chains Were Carried Forward to Snake Away the Hot Machinery

they ran from the well, tearing the flaming garments from their bodies.

A water line was quickly laid a half mile to the nearest creek, and two large storage tanks near the well were filled.

M. M. and Harry Kinley, official "shooters," flew from Tulsa, Okla., to Tyler, where they found one of the most difficult jobs they ever tackled.

The Kinley brothers are not novices at the business of extinguishing oil fires. Back of them are fifteen years of experience, and they bear many marks telling of the price paid for their victories.

They finally decided an attempt should be made to shoot the well with nitroglycerine, but the white-hot metal lying around the well first must be dragged away and cooled off, for it was feared any hot metal left near by might re-ignite the stream.

Clad in asbestos suits, the Kinley brothers approached the well, and hooked cables to the hot machinery which then was "snaked" out of the danger zone by tractors.

A gooseneck joint contributed in large measure to the hazard of subduing the

wild well and did much to retard placing the nitroglycerine which finally brought victory. The fire was spread out near the surface of the ground by the gooseneck casing flange.

A couple of machine guns were brought by state rangers with the hope they might be used to shear off the hindering joint, but it was decided they could not do the work.

A cable finally was attached to the top of the joint and it was bent over to an angle, making it possible for men to walk around the well with the cable and unscrew the joint after twenty-six revolutions had been made. Then they were unable to unseat the joint.

At last, a seventy-quart charge of nitroglycerine was exploded under the joint, and it was blown up.

The charge, which it was hoped would serve the double purpose of removing the joint and extinguishing the blazing well, hardly caused the flames to flicker.

Undaunted, the fire fighters prepared a much larger dose, packing 200 pounds, or about 130 quarts, in an asbestos-covered container on a "sled" of pipe.



Courtesy Dallas News
Preparing a Seventy-Quart Charge of Nitroglycerine to Blow Away a Joint That Was Diffusing the Flaming Spray

A cable attached to the sled was pulled to the opposite side of the well from the nitro charge, and the sensitive bundle hauled cautiously up to the base of the flames. From only 200 feet away, the Kinleys closed an electric switch—and thousands breathed a sigh of relief. The fire was out.

Then a steel derrick, which had been built while the flames were raging, was skidded over the hole and the spouting gusher capped with special apparatus.

MOON'S INFLUENCE ON QUAKES IS STUDIED IN WEST

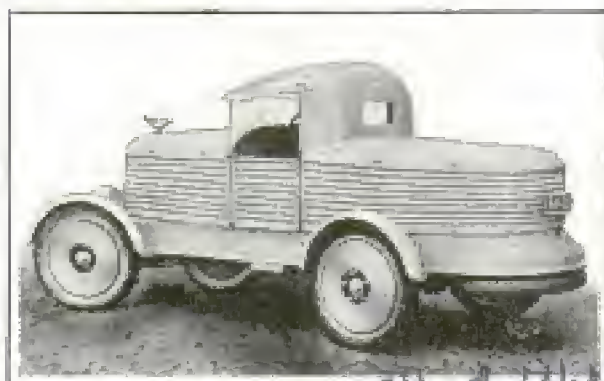
In far more cases than chance would allow, earthquakes occur when the moon is in a certain part of the sky, the critical time seeming to be about five hours after it has reached its highest point and again some twelve hours later. Dr. Maxwell W. Allen, California scientist, who has studied the relation of the moon to earthquakes, says the shocks are not caused directly by the moon, although it may

have an indirect influence. Recent California quakes are believed to have had their origin in some weak part of the San Jacinto fault and it is Doctor Allen's theory that at some relatively shallow depth, there is a point unable to resist the pulling forces exerted by the moon, and the quake is "set off" there. Strong shocks, on the other hand, seem to occur mostly a few days after the moon is either new or full, in which case the sensitive spot of the crust would appear deeper and more plastic. Forces can thus deform this layer without creating a disturbance, except by the repeated action of the tidal pull from day to day. Doctor Allen believes that the moon may produce these effects either by a direct pull on the surface of the earth or by piling

up waters in the upper part of the gulf of California, although it is not yet known which actually starts a quake.

AUTO WITH "STRAW HAT" BODY KEEPS PASSENGERS COOL

"Straw-hat" automobiles are the latest fad in the Madeira islands, where a motor car with body, running boards and fenders of straw was exhibited recently. The idea is to keep the passengers cool.

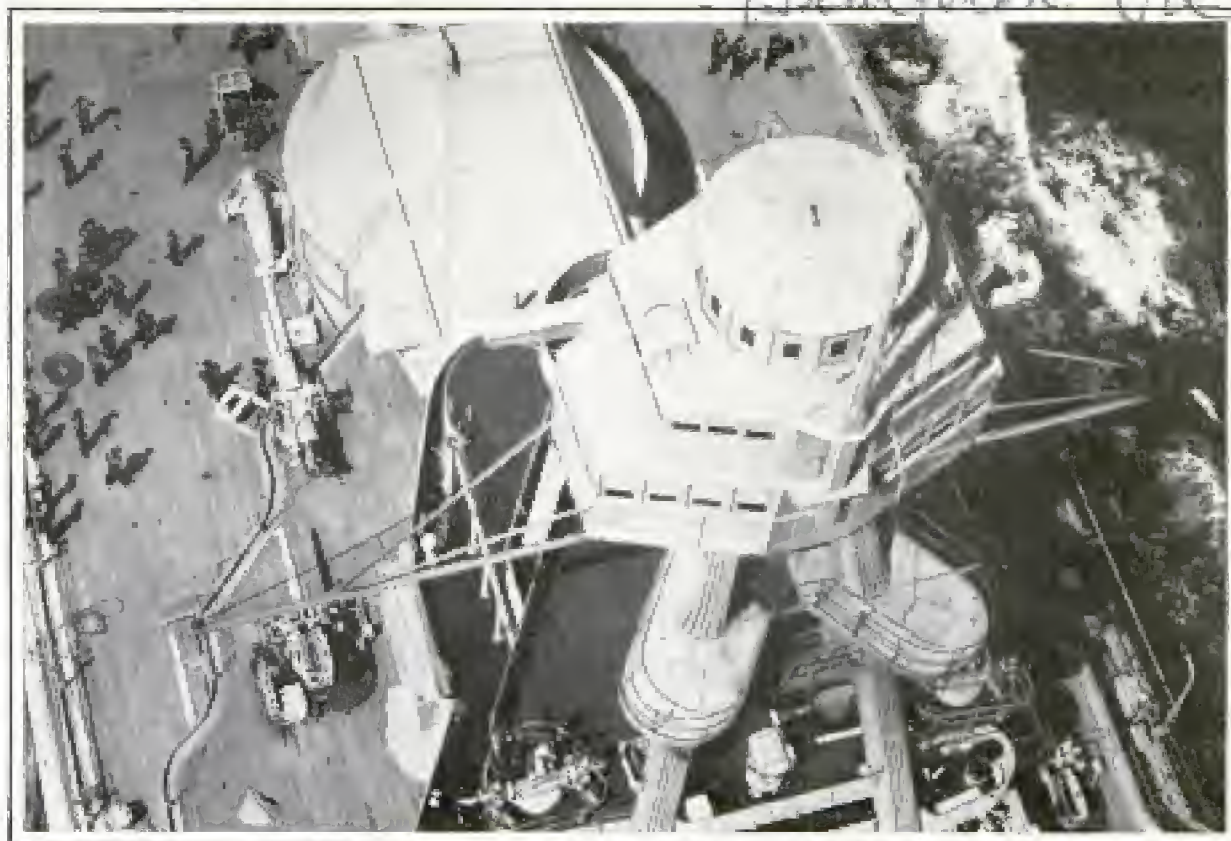


Woven Straw Gives This Auto a Summer Dress the Year Round in Tropical Madeira

Q 1206

San Diego, Calif.

Hampton Va



A Modern Battle Cruiser as It Might Appear to a Seagull Flying Overhead; This Unusual View of One of Uncle Sam's Fighting Ships Was Taken from an Airplane

BIRD'S-EYE VIEW OF WARSHIP TAKEN FROM AIRPLANE

Some idea of how a United States battle cruiser might appear to a bird flying above it may be gained from an unusual view of such a vessel made from an airplane. Members of the crew are depicted in the photograph as mere pygmies and even the boat's guns appear like a boy's toy cannon.

A-1156 MAGNETIC DEVICE PUTS EDGE ON SAFETY-RAZOR BLADES

Safety-razor blades can be kept keen-edged for many more shaves than usual by a magnetic sharpener that preserves the cutting edge automatically and without stopping or other form of hand manipulation. The sharpener consists of a small case con-



taining a magnet of alloy steel terminating in two poles to hold the blade. Before each shave, the blade is placed in the case and the cover closed, then the lid is opened, the blade turned and the process repeated, or the wafer can be kept in the case between shaves, and turned over just before using. The magnet is not intended to put a new edge on old blades, but to keep a keen edge on fresh ones. Examination of any blade under a microscope shows not an edge but a myriad of tiny, jagged teeth, and each shave twists and bends these teeth until finally the blade becomes dull. The magnet pulls these teeth down flat against the polished surface, thus keeping the cutting surface more nearly uniform.

A-1301 SCALES WEIGH MOVING TRAINS

Scales that record weights up to 400 tons and strong enough to withstand the shock of a locomotive passing over them, are now being employed by the railroads to weigh moving trains. The scales are constructed in seventy-five-foot sections suitable for weighing, while in motion, the longest and heaviest cars now in use.

Factory - Sanford Conn

Chicago - 1611 Madison Ave

Reported by A. B. Overfield, Chief Engr. Ex. J. F. Carbanks

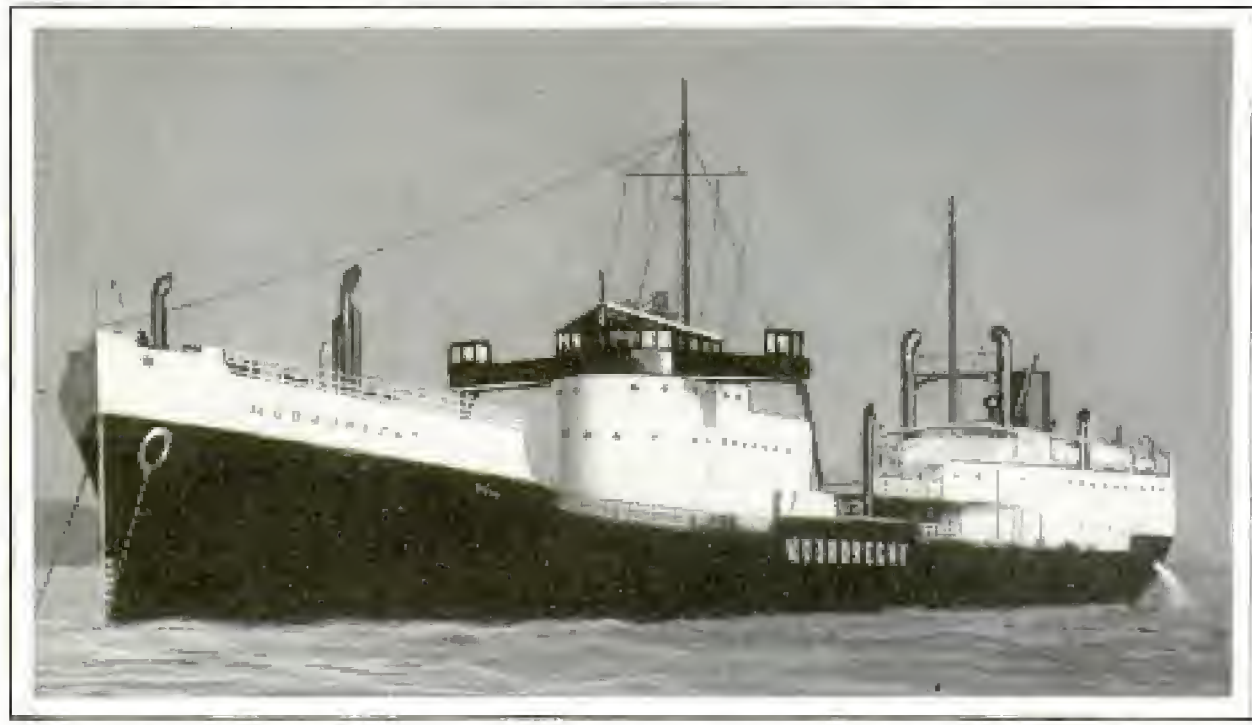
Monroe Specialty Co
119 W. 23rd New York

Pennsylvania
New York Central

107 1
252

Cont: H. I. Wilkins, Esq. 29 Bean
Road Berkeley Beach, near London
POPULAR MECHANICS Eng

LATEST OIL TANKER IS BUILT LIKE A BATTLESHIP



Dutch Oil Tanker Equipped with Armored Turret Like Those Used on Battleships; It Has a Wheelhouse on Its Summit and Forms a Protection for the Crew in Case of Fire or Explosion

As a protection to the crew from fire or explosions, a Dutch oil tanker is equipped with an armored turret very similar to those on battleships. This turret forms the quarters of the captain and officers and has a wheelhouse on its summit. The movements of the ship are controlled from this compact bridge which is placed in a position above danger from fire or explosions originating in the oil tanks underneath.

OVER NINETY KINDS OF APPLES GROWN ON ONE TREE

Ninety-one varieties of apples have been grafted on one apple tree by a Canadian farmer. In the autumn, the fruit shows distinct differences. The grower now hopes to graft 100 varieties on one tree next season. In another experiment in apple grafting, a mountain ash has taken several apple grafts. Efforts to graft pears on the apple tree were not successful.

TROUT GUARD DRINKING WATER

Trout are used by the Paris waterworks department as guardians against an overdose of chlorine in the drinking water supply. These fish have been found to be as sensitive to chlorine as canaries and

white mice are to impure air in mines. Before the drinking water goes into the mains, some of it is diverted to the tanks of an aquarium. If the trout are unaffected by the chlorine content, the water is considered safe.

SHELLER FOR PEAS AND BEANS LIKE CLOTHES WRINGER

Peas and beans are removed from their pods easily with a sheller that operates like a miniature clothes wringer. It is held to a table top by vacuum cups, and the pods are fed, stem first, into a spout.



As a handle is turned, they pass between two rubber rollers, the seeds being separated from the pods and falling back down the spout, while the pods pass through the rollers in the opposite direction. A pound of peas can be shelled

in about four minutes, it is claimed, with this kitchen aid.

H.A.L. Wood, Kingsclear, B.C. Canada

A-1217

Technik für Alle
June 1931 0-119

Holmes & Co.
645 S. Olive St. Los Angeles, Calif.

**MERCURY CAUGHT
BY STEAM FROM
HOT SPRING**

Recovery of mercury by pumping hot water from wells located where there are steam and sulphur vents, is believed feasible as the result of tests conducted by the owner of land at a hot spring near the California-Nevada boundary. The test was made by suspending copper plates in the fumes, which, when left overnight, tested six to eight pounds of mercury to the ton. It is planned to drill a number of hot-water holes and treat the fluid that is forced up by the steam. A number of by-products of the process, including the manufacture of dry ice, are foreseen by experts who have assisted in the process.



Tube and Other Apparatus Employed in Creating a Man-Made Aurora Borealis Expected to Open Way for Further Study of Nitrogen

**MAN MAKES AURORA BOREALIS
IN A LABORATORY TUBE**

After five years of effort a scientist has succeeded in creating the aurora borealis in a laboratory discharge tube. Dr. Joseph Kaplan, of the University of California, who produced the aurora spectrum expects the feat will enable scientists to clear up any differences of opinion as to the cause of the phenomenon and also anticipates the experiment will open the way for a further study of nitrogen. Early in his work, he found he could produce a portion of the aurora in a discharge tube, but since the peculiar nature of the spectrum is due to the fact that the aurora is an electrical discharge in the upper atmosphere, the problem of re-creating it artificially became one of changing the

glass walls of the discharge tube so they would behave as if not present at all. This was accomplished by allowing an electrical discharge to pass for a long time through air maintained at one-millionth of the atmospheric pressure. This coated the tube with a film, and a more faithful reproduction of the spectrum resulted.

**LUNCH ROOM LIKE LOCOMOTIVE
AND PASSENGER COACH**

After converting an old railway coach into a stationary lunch room, the proprietor of one such establishment decided his customers needed a further illusion of going somewhere when they entered. To add the extra atmosphere, he did some trick painting to produce a locomotive. Patrons approaching the lunch room now have the impression that an engine is attached to the diner, ready to pull out at any minute.



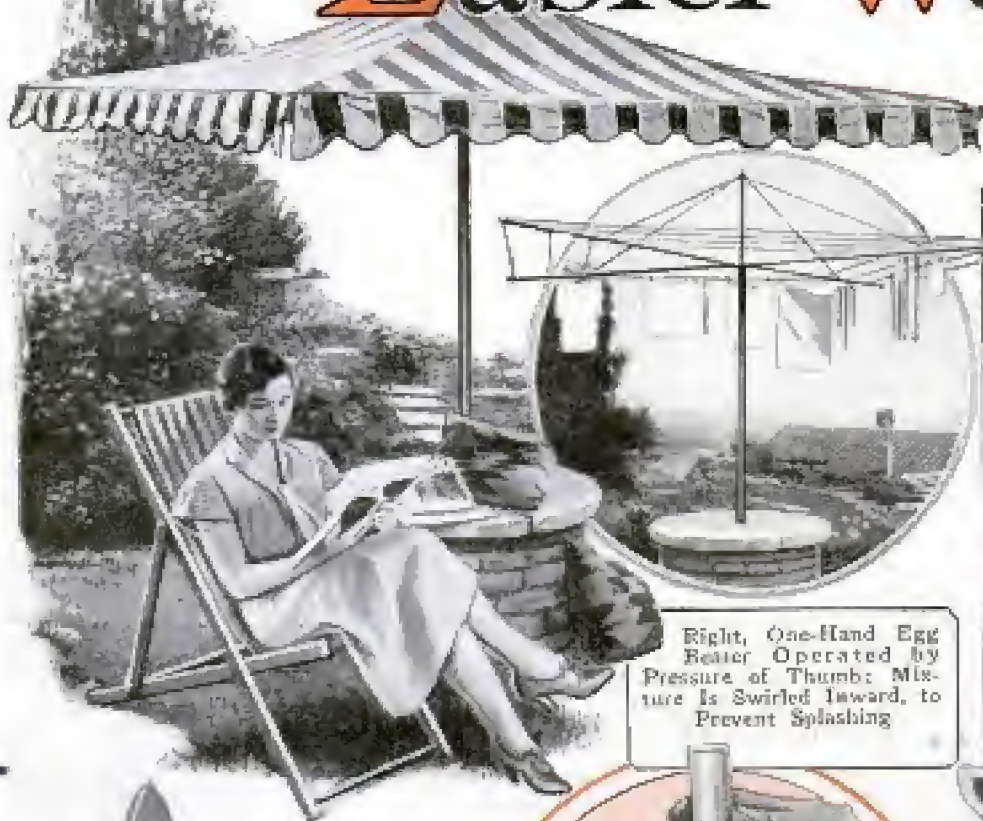
A Stationary Lunch Room That Looks as if It Were Ready to Travel; It Consists of an Old Railway Coach and a Painted Locomotive

at Narragansett Pier
R.I.

Southern California
Los Angeles, Calif.

and Thos. W. Whitcomb, 6133 Spruce St. Phila.

Easier Ways



Right, One-Hand Egg Beater Operated by Pressure of Thumb: Mixture Is Swirled Inward, to Prevent Splashing



Above, a Clothes Drier and Lawn Umbrella in One; It Has a Revolving Top of Rust-proof Metal, and a Canopy and Sidepieces to Convert It into a Tent



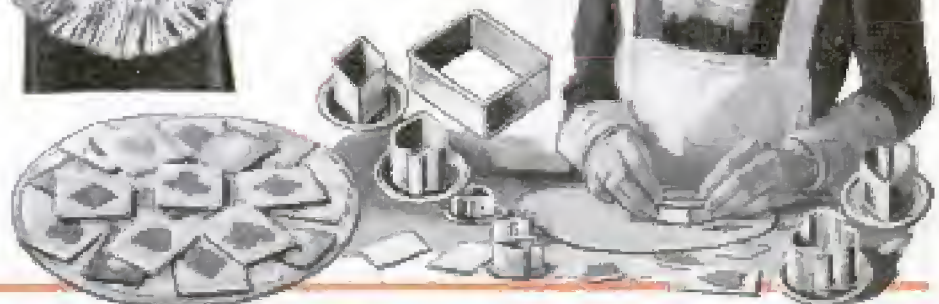
Left, Perforated Tube Filled with Tea Which Is Stirred in Hot Water



Above, Camper's Knife with Safety Blade Which Locks into Position When Thumb Is Pressed on Section to Snap It Open; Note the Fish Scraper and the Bottle Opener



Left, Mitten Map for Washing, Dusting and Polishing Furniture or Auto; Below, Cookie-Cutter Set for the Bidge Party



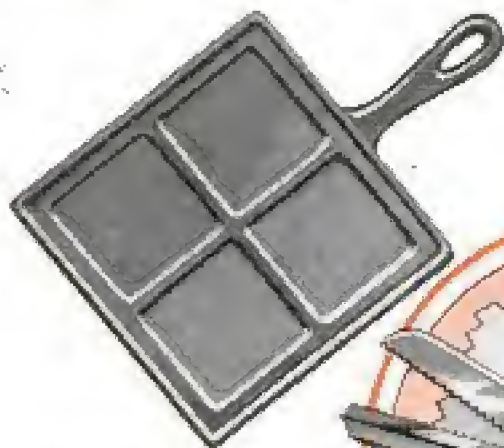
of Doing It



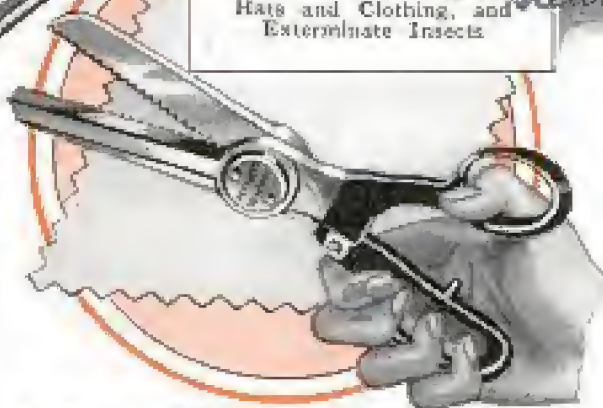
Above, Aluminum Skillet with a Heat Meter in Its Top, to Show the Temperature of Contents



Above, Portable Steam Furniture Renovator That Operates from House Electric Current; It Can Also Be Used to Clean Hats and Clothing, and Exterminate Insects



Above, Square Fried Eggs Can Be Cooked in This Pan Which Maintains a Uniform Thickness of the White Part, Thus Preventing Burning the Edges; It Also Can Be Used for Cooking Grid-dle Cakes



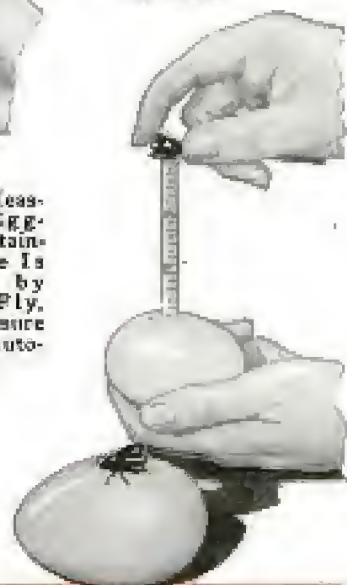
Left, Pinking Scissors Whose Zigzag Edges Are Self-Sharpening; the Tool Cuts and Pinks Any Kind of Material Evenly in One Operation



Above, a Simple Cutter Which Makes a Dainty Fruit-Basket Design, Like That Shown at Right, Out of an Orange in Less Than One Minute; It Is Simple to Operate and Easily Cleaned



Right, Tape Measure in an Egg-Shaped Container; the Tape Is Pulled Out by Lifting the Fly, and the Measure Winds Up Automatically



For further information.
write Daniel Hodgman.

Herald Tribune.
6/7/31

POPULAR MECHANICS

256
American Combustion Engineers

CHIMNEY WASHES THE SMOKE
AND CUTS FIRE HAZARD

Closed.

on Los Angeles Hotel



The Gooseneck Washer for Smoke Also Acts as a Water-Controlled Damper

To reduce the smoky haze surrounding cities and to obviate fire hazards, a chimney has been developed that "launders" the smoke and quenches in the water any sparks that might fly. It is built with a curved neck emptying into a metal basin filled with water. By lowering or raising the water level the draft is regulated. Designers of the stack claim better combustion and considerable fuel savings.

COLOR OF VEGETABLES SHOWS
THEIR VITAMIN CONTENT

A-126

Color of vegetables is related to some extent to their food content, and the yellow plants furnish the equivalent of vitamin A. The pigments of plants have attained new significance through the discovery of unexpected potencies of some of their colored constituents in human and animal food, says Dr. Lafayette B. Mendel of Yale University, an authority on nutrition. Various yellow vegetables

seem to furnish the equivalent of vitamin A, the food factor abundant in butter and cod-liver oil. Yellow corn, for instance, has been found more effective than the white varieties; the yellow sweet potato is richer than the white, and the yellow carrot abounds in something that can avert the lack of vitamin A in the diet. The latest findings indicate that the yellow plant pigment, called caratone, is the forerunner of vitamin A in the body. Apparently some green plants that have been known as comparatively rich sources of this vitamin carry the yellow pigment hidden beneath a veneer of green chlorophyll.

A-1266

TWO THOUSAND PIGEONS RACE

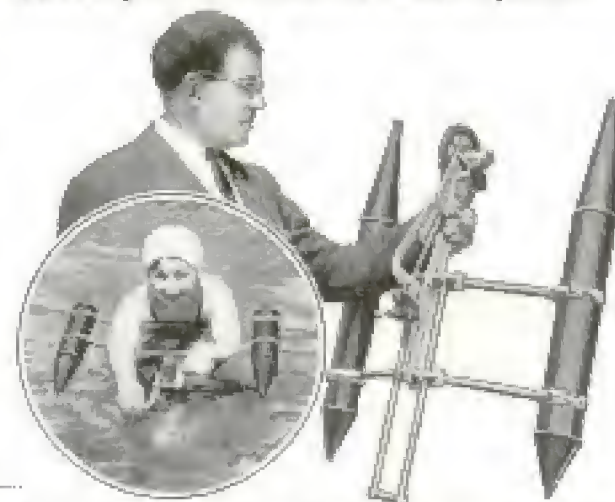
Weary members of a coop of 2,500 pigeons, liberated in the morning near Danville, Va., began the same night to flutter into their coops on hundreds of lofts in New York and its suburbs, after flying 410 miles against heavy winds in the annual homing-pigeon concourse. The average time for the race was about twelve hours, but it was believed some of the pigeons may have arrived in ten hours.

Frank Farrell Secy

SWIMMING MACHINE IS RUN
BY SMALL PROPELLER

A-1198

Supported by air pontoons shaped like torpedoes, a hydro-bicycle has been introduced in Philadelphia to aid in teaching beginners to swim. It is propelled by hand levers which operate a small propeller on the underside of the frame. It will support weights up to 500 pounds, and may also be used for water sports.



Swimming Machine That Teaches Beginners and Provides a New Toy for the Water

J.W. & E. Storie
Strandburg, Pa

Stirling professor of
physiological chemistry

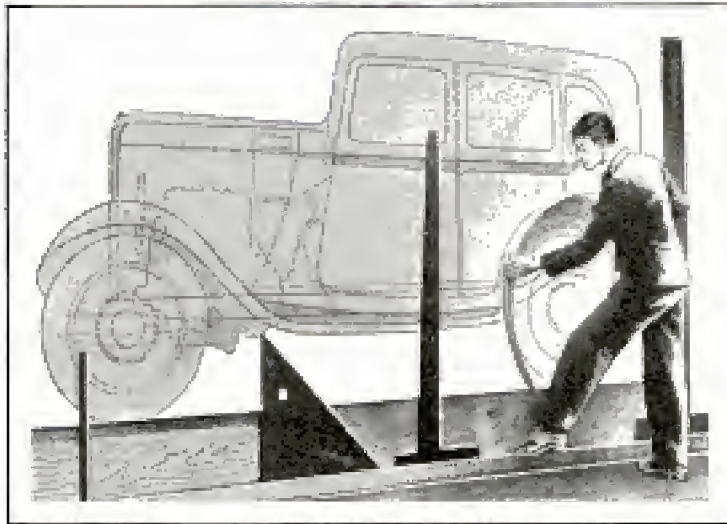
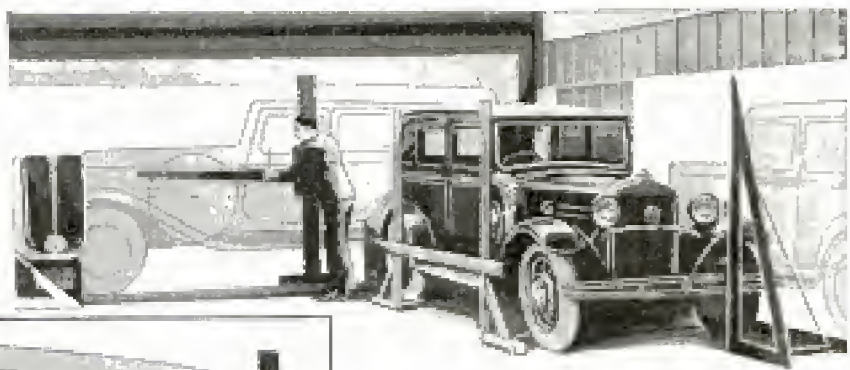
Murray Bell Homing Pigeon Club

Q 1050

Coverday Work
Singer Car Co

HOW YOUR AUTO IS GIVEN ITS BEAUTY OF LINE

From radiator cap to tail light, designs for automobiles to be produced by a British maker are drawn full size before they are finally approved. An artist-engineer does the work on a drawing board as big as



Artist-Designer Making Full-Scale Drawings of Auto Bodies, to Show Appearance of Cars When They Are Completed

the side of his workshop. By making the designs full size, he can easily discover whether or not his ideas for improvements in appearance will work out practically. A panel at the base of the big board guides the artist's seven-foot T-square. Every detail of equipment and accessories is carefully drawn and checked to determine its effect on the final appearance of the car.

TAME THUNDERBOLTS ARE AID IN POWER-LINE STUDY

Outside a laboratory at Purdue University hangs an artificial electric "cloud" and inside is caged a million-volt stroke of lightning, also man-made, so tamed that it hangs away by the hour at the cloud with no more fuss than a bright spark and a snap like a small firecracker. Between the artificial cloud and the ground pass the wires of a power line, and by storming away at this line with the thunderbolts, engineers are hoping to find ways to minimize the winking out of

lights during storms. The cloud is a group of parallel electrified wires which produce no moisture but radiate to the earth the same electrical forces which supercharge the air during a thunderstorm. Hanging a foot below the cloud, the power line is in precisely the same kind of electric field that would surround it if coming from a real cloud several thousand feet distant. The effects of the tamed stroke are equal on this small-scale storm to those of a huge thunderbolt under natural conditions. Through

the experiments, the engineers determine the effects of unexpected strain from the induced charge of electricity sent over the light wires, and the added insulation needed to prevent damage.

LIONS WORTH LESS THAN APES ON ANIMAL MARKETS

Lions are the lords of the jungle but their value on the open market is often much less than that of other animals. A good gorilla usually is worth about \$1,000, while lions have sold for even less than \$200. And a gorilla is a risky purchase because the climate of most American cities is hard on the big apes. In the zoo market, the rhinoceros brings the highest price—\$5,000 or more. Snakes are sold by the foot, some of the more interesting varieties selling at \$15 a foot. Giraffes have recently gone up in value and run the rhinos a close race in price. A pair of angelfish are snapped up at \$100. Among birds, the little blue lovebirds are worth their weight in gold.

Herald Tribune

5/24/31

Answers

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Simpler Tool Co. Station

258
a. 11 2 7

POPULAR MECHANICS
Woonsocket R.I.

W3 x K

near Washington

Vise the Jaws of Which
Are Controlled by
Treadle, Leaving Both
Hands Free



WISE IS OPERATED BY FOOT INSTEAD OF HAND LEVER

Bench workers, faced with the necessity of handling many pieces of work in a vise, find that a foot-operated release for the vise jaws not only saves time but simplifies operations. A recently developed treadle adapter for a standard make of vise opens the vise jaws about half an inch, so that no change need be made in the vise setting for a series of work units of approximately the same size. On releasing the treadle, a spring operates a toggle action on the vise jaws, exerting a pressure sufficient to hold a piece of work firm under most bench conditions.

FOUR-BLADED SHIP PROPELLER REDUCES AIR SHOCK

Two years of pondering by a ship's officer have resulted in a four-bladed, seven-ton brass propeller, for installation on a Canadian freighter. Each of the blades has a "canal" cast in it, starting on its pressure side and ending near the hub. Air collecting against the sides of the blades is expected to escape through the apertures and thus reduce vibration and loss of speed. Less pitch of the blade also is said to be required.

EDUCATIONAL MOVIES ON AIR IN TELEVISION TESTS

Educational moving pictures made by the department of agriculture are now on the air as well as on the screen. Recent experiments with several of the department's movies, broadcast from a station near Washington by television, brought favorable comments from points as far south as Georgia and as far north as Massachusetts. These pictures were sent in halftone, direct from the film, on a wavelength of 145 meters.

LINEMAN RIDES PHONE WIRES MANY MILES A DAY

Telephone wires carry other things besides conversation, as proved recently when a lineman literally traveled by wire from London to Brighton. He was one of the engineers engaged in installing a telephone extension between these cities and rode in a seat suspended from a strand of cable. Besides saving much time in his work he found that he was able to make good speed in his aerial conveyance, covering several miles a day.



Lineman Riding Telephone Wires over a Busy Highway on a Seat Suspended from a Cable

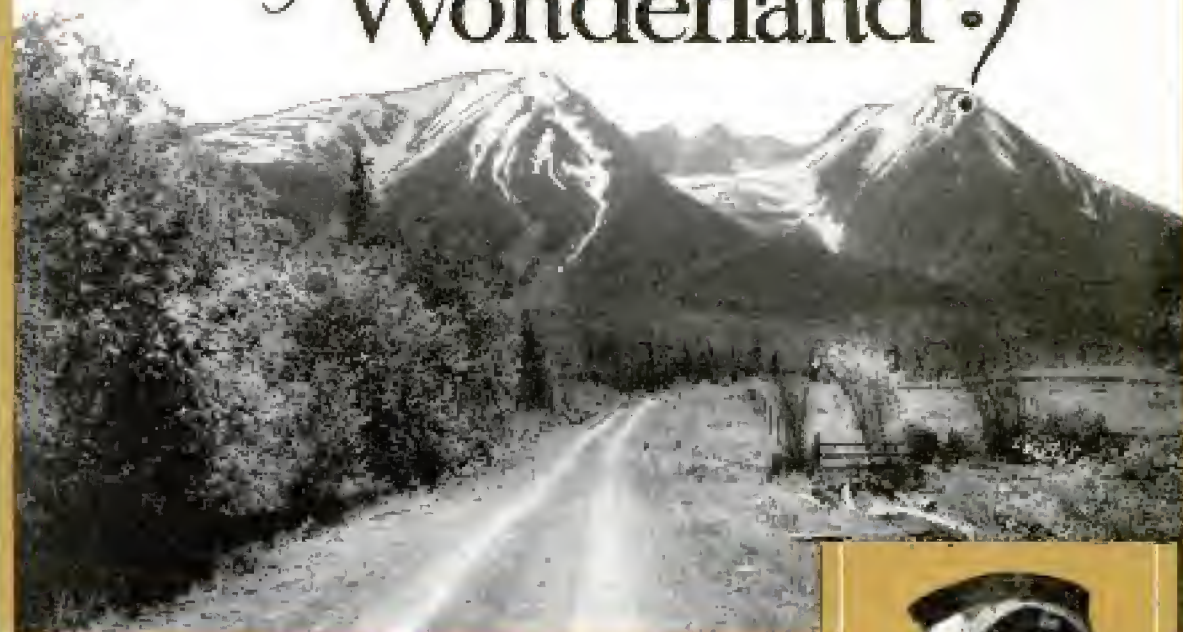
Propeller built by J. S. Gano & Co.,
Woonsocket, R.I.

Master Propeller Co.
R. 902, 420 Lakeshore N.
Montreal, Canada

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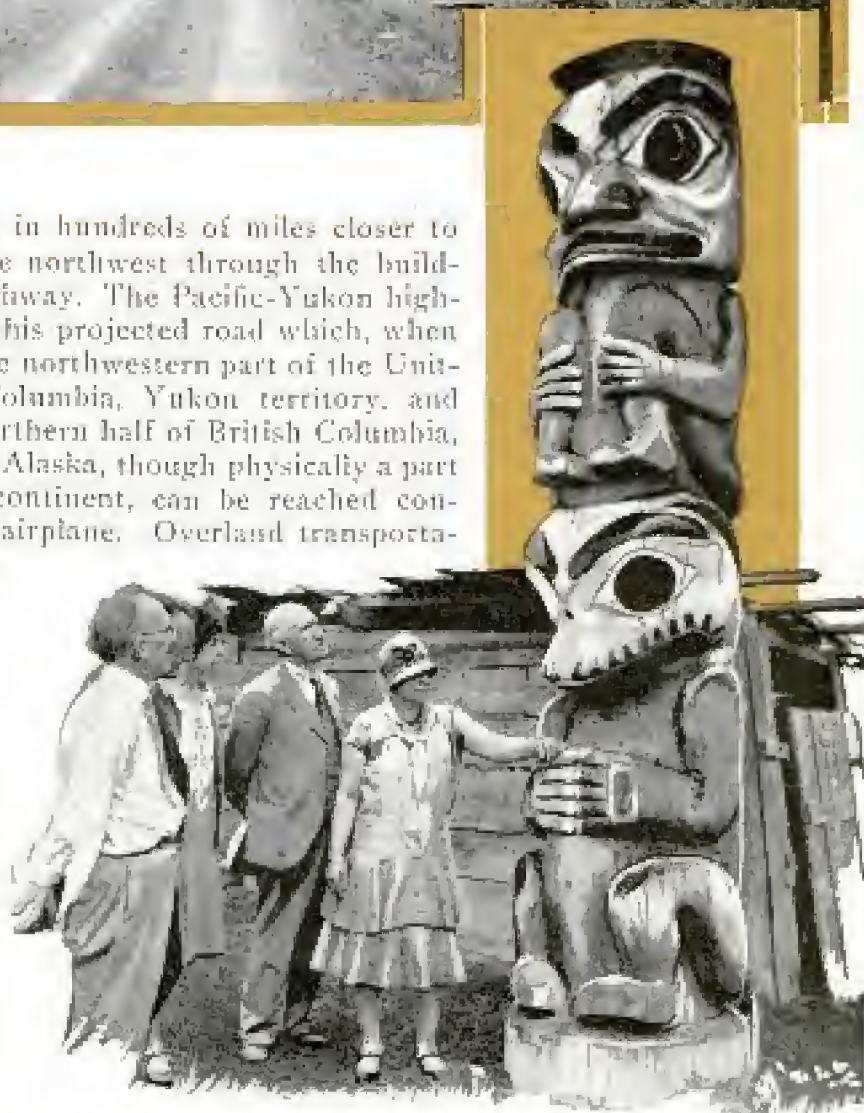
A 1694 Cont. Lseo. Fr. Paul, R.
1409, 837 S. Dearborn Chwy.
see Travel File

By Auto to Alaska's Wonderland?



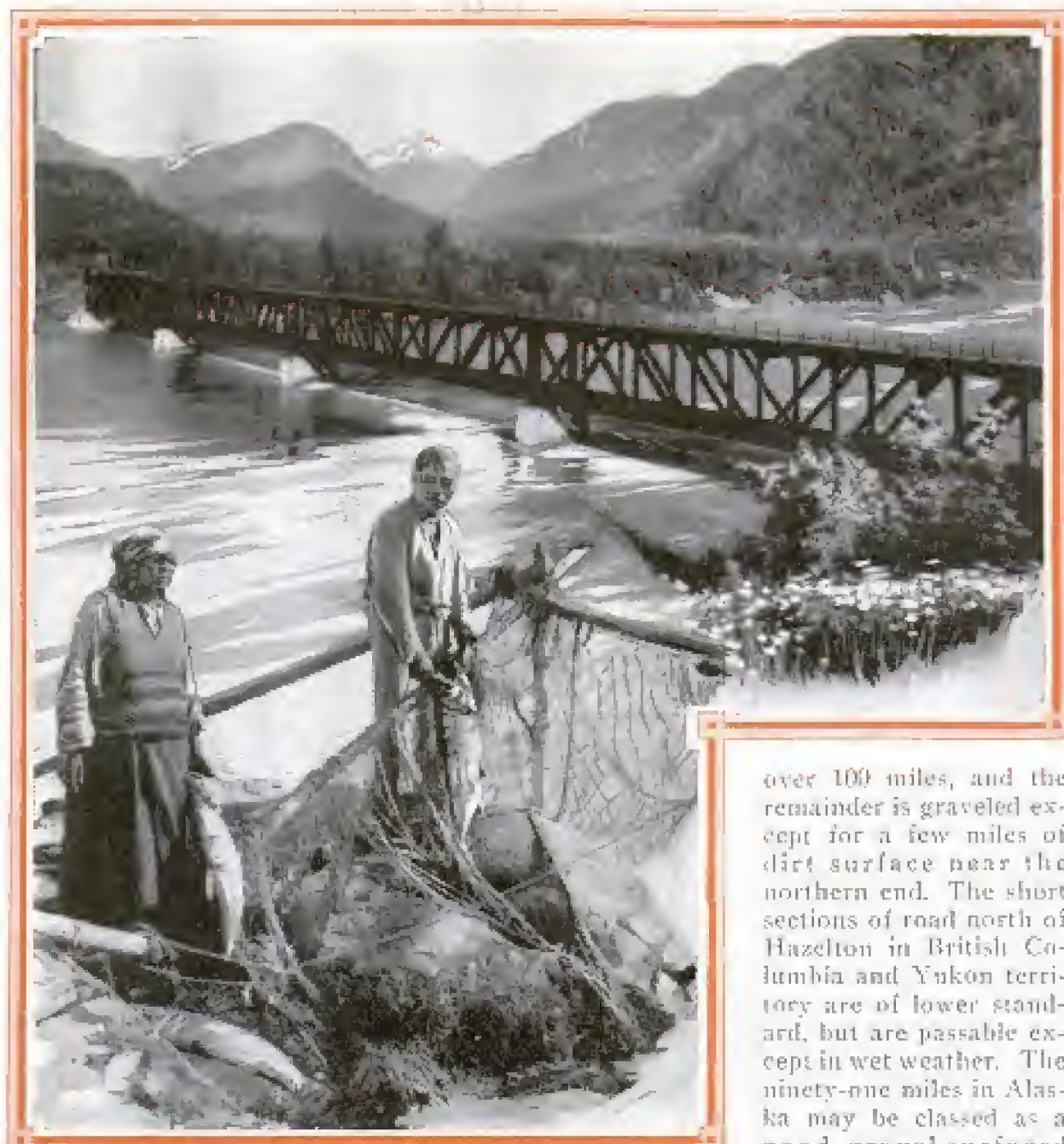
ALASKA will be pulled in hundreds of miles closer to the great cities of the northwest through the building of an international highway. The Pacific-Yukon highway is the name given to this projected road which, when completed, will connect the northwestern part of the United States with British Columbia, Yukon territory, and Alaska. At present the northern half of British Columbia, all of Yukon territory and Alaska, though physically a part of the North American continent, can be reached conveniently only by ship or airplane. Overland transportation to this great country is impracticable except by pack horse or walking.

The mighty Fraser river has always been the avenue to central British Columbia. In the early days, the boats went up this river to Yale, and from there the travelers went in quest of furs and minerals over the famous Cariboo highway, built in 1859-63. This road is now extended, and you can drive in ease and comfort from Seattle, through Vancouver,



Above, Road in British Columbia with Hudson Bay Mountains in Distance;
Below, Totem Poles at Skeena Crossing, near Hazelton, B. C.

Refer inquiries to Chamber of Commerce
Seattle, Wash



Railroad and Highway Bridge across Fraser River at Hope, B. C.; Below, Indian Chief and His Wife Fishing near Hazelton

over 100 miles, and the remainder is graveled except for a few miles of dirt surface near the northern end. The short sections of road north of Hazelton in British Columbia and Yukon territory are of lower standard, but are passable except in wet weather. The ninety-one miles in Alaska may be classed as a good gravel-surfaced road over which traffic passes without difficulty

to Hazelton—nearly 1,000 miles. North of this there are no roads except short systems radiating for a few miles from the settlements.

Out of a total distance of about 2,221 miles from Seattle, Wash., to Fairbanks, Alaska, there already are available about 1,249 miles of road, leaving 972 miles of new construction for completion of the project. Of the new work, British Columbia has 452 miles, Yukon territory 294 miles and Alaska 226 miles. The road from Seattle to Hazelton is good. At the southern end there is hard pavement for

at all times during the short open season.

In addition to the mining, industrial and agricultural development that may be expected to attend the construction of this new highway, there is also the touring value of the project. Several thousand people from all parts of the United States annually visit Alaska on the steamships. Probably even more will tour Alaska by automobile, especially when, in doing so, they can traverse a region so rich in scenic advantages and historical significance, and unexcelled in hunting and fishing opportunities.

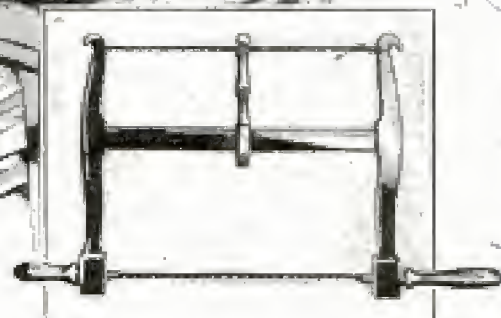
RARE TOOLS SHOW PROGRESS OF WOODWORKING

Carpenters, both amateur and professional, and woodworkers will be interested in the hobby of a Boston woman, which is the collection of rare and nearly obsolete woodworking tools, and their use in the making of reproductions of early American furniture. She spends a great part of her time in the collection of these tools, and in making "pegleg" furniture, one of the earliest types made by the first settlers. In the collection are many items that are practically obsolete, so far as their present use is concerned, having long been superseded by machinery. Routed out of farmhouse attics, old barns, and abandoned shipyards, the collection constitutes a veritable museum by

which can be traced the evolution of woodworking tools, though some prove that these have not been changed in design and construction since the days of the Romans. "Many tools termed modern," she says, "are similar in design to those used by the Assyrians, Chinese, Greeks and Egyptians thousands of years ago." In the collection is a carpenters' brace or bit-stock, handsomely ornamented and strengthened with brass, used in America during the eighteenth century, which is almost identical with that shown in a Flemish wall painting of St. Joseph at work as a carpenter, painted in 1438 and now hanging in Brussels. There are also ancient saws, toggled with homespun hemp rope; a huge paring chisel, six inches wide and three feet long, used in a shipyard; a rare compass plane, adjustable by thumbscrews to any desired curve; many old jackplanes, quaint and primitive; several pull planes, used by coopers; a toothing plane, a gutter plane, used for smoothing the concave surfaces



Women Making "Pegleg" Furniture as Hobby, and Old-Time Compass Plane and a Turning Saw



of rain gutters; a convex plane for use on the outer curve; several molding planes; screw boxes for threading wooden pegs; an old "Worral-patent" box plane dating back to 1856, with a metal top; turning saws; Indian basket knives; a steel-bottomed double-bed plane; right and left planes in pairs, and many other unique tools. There is a ship drill without a center core; a shingle ripper; a screw box and threader in pairs, giant screwdrivers three feet long; peculiar mortising chisels, and many other tools never used today. The owner of this collection, the largest of its kind in the country, has spent years at woodworking, having taken a course in carpentering at school and later a woodworking course at the Massachusetts Institute of Technology.

Those wishing further information on anything described in the editorial pages can obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.

Ans. J. N. Hollagarsworth, 18, Huntington Ave Boston, Mass

same address

also } Mrs. Theodora B. Jones
Mrs. Charlotte L. Ware

a 10 30
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Chicago Rapid
Transfer Co

POPULAR MECHANICS

Same Series
529-a. 5/11/21



Electrified Map of Chicago's Elevated-Railway System with Colored-Light Signals to Indicate Power Requirements along Lines

ELECTRIC MAP SHOWS POWER NEEDS OF RAILROAD

Two walls of an office high in a Chicago building are covered with an electrical map which reproduces the entire 230 miles of track in the elevated-railway system of the city. Little colored electric lights flare up to indicate a power need somewhere along the track. Power supervisors, seated at a telephone switchboard below the map, relay the information and correct the difficulty.

S-SHAPED ROTOR GETS POWER FROM WIND AND WAVES

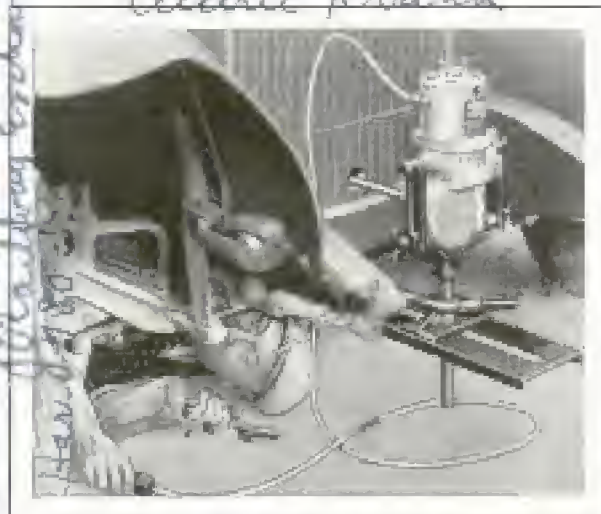
Picturesque but inefficient old-style windmills are being replaced in many parts of Europe by an S-shaped vertical rotor, the product of an inventor in Finland. The S-rotor is a development of the Flettner rotor, which was widely demonstrated a few years ago as a power source for ships. However, the Finnish invention works on a different principle, using the direct power of wind or water, whereas the Flettner rotor relies on the "skin friction" of wind against a curved surface. In making the first S-rotor, a Flettner rotor was cut in half vertically

and the halves separated along the cutting line. One advantage of the S-rotor is that it always revolves in the same direction and does not have to be turned about to face the wind or the tide. It has been found to be highly effective in ventilating systems and in creating strong suction to draw smoke through sluggish chimneys. As a windmill, it is said to cost no more than ordinary types, although its efficiency is greater.

ELECTRIC CRANK TURNS ENGINE IN REPAIRS

Controlled by a push button on an extension cord, an electric crank

that fits any car takes the place of one mechanic when work is being done on bearings, connecting rods, valves, or other parts of the automobile which necessitate revolving the motor. The crank turns as slowly as desired and stops the motor at any point, giving positive control for any operation. During cold weather, the electric crank can be used to start cold motors, thus saving the work of towing. It is attached to the front axle, can be adjusted to the height of any crank and operates from any light socket.



Electric Crank That Clamps to Front Axle and Turns Over Motor during Repairs in Car

Portable Power Tool Co
Warsaw, Ind

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Proof of the Power of Wind and Waves Is Offered in These Two Pictures. One Taken Immediately After a Vessel Had Gone Aground, and the Other Twenty-Four Hours Later

WIND AND WAVES WRECK SHIP IN TWENTY-FOUR HOURS

Pounding waves and whistling wind, if given an opportunity, are capable of converting the stanchest vessel to driftwood in a few hours. No better illustration of this is found than in two remarkable pictures of the motor ship "Malabar," one

taken nine hours after it had gone aground near Sydney, Australia, and the other twenty-four hours later. The first photograph shows the boat still in fair condition after the passengers had been taken off. The second reveals parts of the broken hull and a mass of jumbled wreckage when the wind and waves had finished with the big ship.

FLEXIBLE-STEEL RAILROAD TIE

To overcome the disadvantage of rigidity that handicaps most metal railroad ties, a German inventor has made a flexible steel tie that retains the strength and permanence of the more rigid ones. It

consists of a tube of approximately elliptical cross section, slotted along its lower side in order to allow a certain amount of "give" when a train passes. The hollow interior is filled with ballast, and sideslip on curves is prevented by stopping the open ends of the ties with steel plates.

Inv. Herr Franz H. Daurah
bei Dresden, Germany
Scheibe & Klotzsche

International

at Long Bay.

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Q. 84

Carl Andrew R. Boone
613 Spruells Theatre Bldg
San Diego Calif.

General Manager, Hornes Zoological Arena
505 Alvarado St. Alhambra, Calif.

D

Did You Ever Hear of a



Photos Courtesy I. S. Horne

This Creature with the Pessimistic Outlook on Life Is a Giant Elephant Seal, One of the Rarest Animals to Be Imported

agents in eighty-five localities throughout the world, expert hunters and trappers who capture vicious black tigers, temperamental antelope, timid deer, and animals who thrive on bugs. His biggest task lies not in capturing the animals, but in readjusting their diets so they will thrive in captivity. Animals, Mr. Horne has found, enjoy captivity once they learn they have nothing more to fear from marauding enemies. They grow fat and happy.

But their food! Primarily an "animal man," Mr. Horne also has become a chemist and physicist, devising foods

FROM a hundred localities scattered through the world agents of many nationalities gather odd animals that later enter through several ports of the United States, destined for circuses, zoos, and for other places where strange animals are brought together.

The echidna, an egg-laying mammal and one of the lowest types of all mammals; tiny elephants, albino ring-tailed capuchin monkeys, black leopards, blood-sweating hippos, mouselike deers and all manner of animals are brought here for your entertainment.

Rare animals are not available in large quantities, as they were when Theodore Roosevelt roamed Africa with his rifle, according to I. S. Horne, who since boyhood has been importing strange animals from the darker places of foreign countries, and has witnessed the disappearance of the rarer specimens.

Mr. Horne and his organization have

to supplant their natural diets in the wide open spaces. He has, for instance, made a chemical analysis of the spegna moss, lichens and other foods of the reindeer imported from Alaska, Norway and Greenland. From those analyses he devised a formula of minerals to add to the grains of the captives' diet. For other animals, particularly those living on ants and grubs, he adds formic acid, found in the ants' bodies, to the meat and eggs fed in captivity. In this manner, the animals get their necessary vitamins. From kelp he takes iodine, which does away with rickets and strengthens bones in the young.

Some of the animals he imports, Mr. Horne has learned, possess criminal cunning; others are friendly. Among them he finds each year an assortment of temperaments and intelligence one would expect to see only among the varied population of a large city.

"Many animals," explains Mr. Horne,

Babiroussa?

"are temperamental, the antelope particularly. The antelope will lick your hand one minute and try to ram a horn through you the next. Chimpanzees are much the same, but they have an uncanny in-



Capuchin Monkey That Shades Its Eyes in Strong Light; Left, Kodiak Bear in Playful Mood



telligence. The 'chimp' almost can talk. He gestures in a thousand ways."

"But what animals," he was asked, "do you prefer to handle? These intelligent, expressible creatures, or some of those more cunning?"

"Ever since I was a boy," Mr. Horne said, "I have preferred the big cats. We can control them, odd as it may seem, more easily than deer. Antelope and deer are fractious. They break their legs easily. They are constantly battering themselves

against their crates, aboard ship and en route to zoos. Bears, also, present many difficulties. They tear with their teeth and claws. Sometimes they reach through the bars and rip the skin off some handler's arm. But the lions, tigers and leopards, contrary to popular thought, are not man-killers, and once in a cage they lie down and behave themselves. All except the black leopard are tractable. The black leopard is an off-colored or 'sport' of the spotted leopard. It gets its color from inbreeding and is not a distinct species.

"Vicious? I should say the black leopard is the most dangerous animal ever held in captivity."

"What are the rarest animals you ever brought into the United States?"

"Recently we brought across the Pacific two babiroussa from north Borneo.



These animals never were imported before. They are members of the hog family. A circular tusk grows through the upper lip and, in the adults, makes an eight-inch circle over the head and grows down alongside again. One of them died and is now in the Washington museum.

"Mouse deer also are very rare. They stand ten inches high at the shoulder when mature. These tiny creatures exist in limited numbers in Borneo, Sumatra, Java and the Malay peninsula. They eat fresh lettuce, spinach, carrots, apples, hay and grain in captivity. We keep these things on ice and serve them chilled. You see, for every animal we have a slightly different feeding problem."

Also, Mr. Horne explained, some animals are great bluffers. The alligator, found within our own shores, likes to appear vicious, yet a single thumb and finger applied at the top of his mouth can hold that yawning cavern closed. Alli-

gators are easily handled. By tying the mouth closed, six men can pick up even the largest and carry him anywhere.

Two of the rarest animals ever imported are the elephant seal from Guadalupe island and the bear cat (binturong) from Sumatra and Java. The elephant seal eats slowly moving things and swallows them whole. He seldom lives longer than three years in captivity.

The bear cats, of which there are only three or four specimens in the United States, are the only carnivorous animals with tails like monkeys'. They have heavy fur coats and climb trees readily. Oddly, bear cats will not permit handlers

to pet them, yet they will climb up a trainer's leg as though seeking human companionship. They sleep when the sun is out and prowl about their cages in the moonlight.

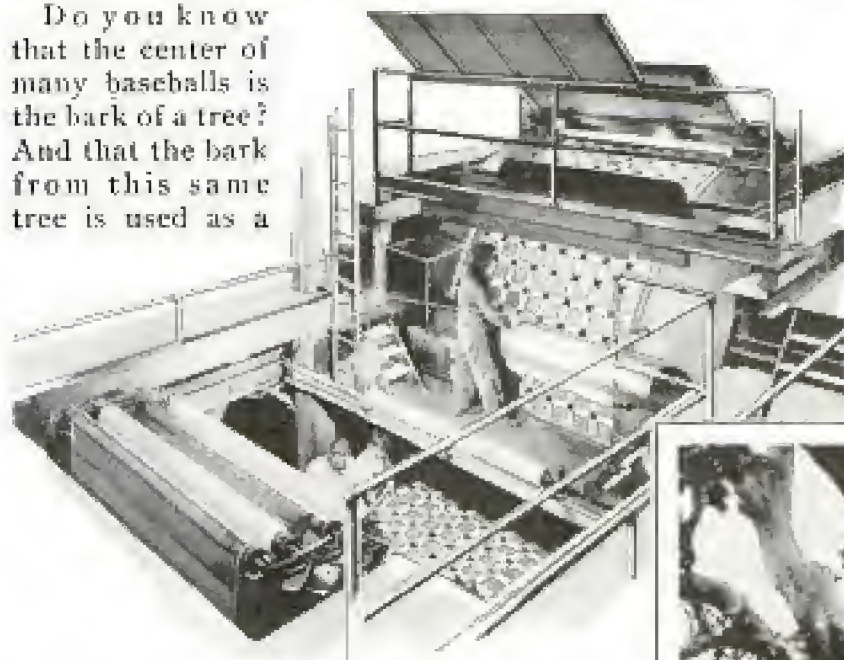
One of the most popular animals is the big hippopotamus. It is supposed to sweat blood, but the substance exuding through the pores is poisons thrown off in this manner.



Top, Blood-Sweating Hippopotamus; Center, Feeding Milk to Baby Seal; Below, Monkey Cuddling Kitten

BARK OF A TREE TURNS THE WHEELS OF PROGRESS

Do you know that the center of many baseballs is the bark of a tree? And that the bark from this same tree is used as a



trunk is sometimes as much as four feet in diameter. One of the most interesting processes in which cork is utilized is in the manufacture of linoleum. This article contains scrap material from the making of bottle corks and other products, but cork can only

Above, Making Linoleum from Scrap Cork; Right, Species of Oak Tree from Which Cork Is Obtained

foundation layer beneath the outside wrapping on the handle of your favorite golf club? The same bark is used in life preservers to keep people afloat and is finding new applications almost daily. Cork is used in your automobile, in your shoes and in many different places about your home. When you go duck-hunting, a lifelike decoy, fashioned from natural cork, is taken along. On your fishing trips, you'll have cork bobbers, while the handles of your fishing rods likewise will be of cork. Cork table mats prevent hot dishes from marring your dining-room table. Cork is the product of two species of oak trees—*Quercus occidentalis* and *Quercus suber*. The trees grow to a height of from twenty to sixty feet, while the



be included in the linoleum after having been ground to a fine dust.

BETTER WAY TO WASH DISHES SOUGHT BY SCIENTISTS

It probably will surprise the housewife to learn that dried egg, after all, is not the hardest thing to get off a plate. Scientists of the Westinghouse laboratories have discovered that a mixture of castor oil and lampblack is more resistant than egg, but the highest standard of dirtiness in dishes is achieved by allowing tomato soup to drop on plates from a height of

six feet and then dry. This covers the dishes with interlocking fibers of about 1,500 circular tomato-soup splotches. The investigations were made in order to find how electric dishwashing machines should be constructed, and various designs are rated according to the number of tomato-soup splotches they can remove in a given time. The efficiency was found to vary from twenty to eighty-seven per cent, but one has been made which removes ninety-eight per cent of the spots.

Cmt. H. A. Kyser, Minter, Ala.
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a 1051

The Woche.
Apr 25, 1931



Automatic Extension Ladder Mounted on German Fire Truck; the Ladder Is Electrically Controlled by Means of a Push Button

PUSH BUTTON ON FIRE LADDER CONTROLS EXTENSION

Germany is modernizing her fire-fighting apparatus and among the latest equipment is a truck on which is mounted an extension ladder controlled by electrical means. The ladder is in four sections, each twenty-five feet long, and can be raised to any height by a mere push on a button. The automatic ladder is not only more efficient in fighting a fire, but adds to the safety of those on it.

RADIO-TUBE COMPASS PROVIDES ADDED SAFETY FOR FLYERS

Two German scientists have made a compass for flyers that depends for its operation upon the fact that so-called

"slow" electron streams, generated by the glowing cathode of a radio tube, are deflected by the earth's magnetic field. For the purpose of the compass, the stream or ray is made to pass a vacuum of certain length and then reflected upon a fluorescent screen where it produces a luminous point. If the ray were not deflected by the earth's magnetic field, the light spot would appear in the exact center of the screen, but, being deflected, the spot falls a short distance from the center and to the east of it. Hence a line connecting the two gives a true east-to-west indication from which the remaining points are laid out on the screen. Since the ray's deflection varies according to the inclination of the airplane in reference to the magnetic field, the compass also shows if and how far the ship is out of level laterally and longitudinally, this information being

read from scales on the screen. It is claimed the compass is absolutely proof against vibrations and changes in flying performance.

PAINT MADE FROM POTATOES

Potatoes provide the base for a cheap and durable form of paint suitable for use particularly on farms for gates, fences or machinery exposed to the weather. One pound of potatoes are peeled and well baked. They are then mashed in three or four pounds of boiling water and passed through a sieve. To the mixture is added two pounds of powdered chalk mixed with four pounds of water. This forms a sort of glue capable of receiving any kind of color, even powdered charcoal or soot for a fine black.

Carl L. H. Eckhardt
4528 Walnut St.
Philadelphia

Mr. Mayer
Mr. Brüche

a-1040

a 1030

"WHAT'S THE JOKE?"—SNAPPED IN ANIMAL WORLD



"Look Pleasant, Please." Requested the Photographer as He Aimed His Black Box at "Fay," a Lioness at the London Zoo; "Fay" Was Obliging and Did Her Best, and Here Is the Result: Top, Center, a Rare Specimen of Toucan Which Seems to Have Heard a Funny Story

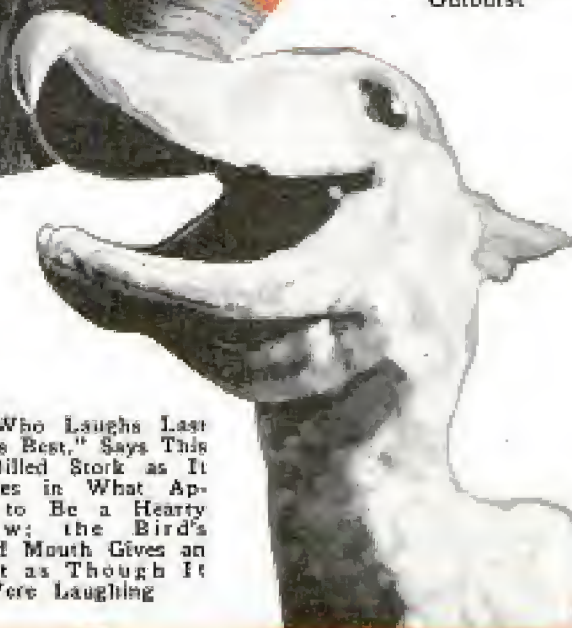


"Laugh and the World Laughs with You" Seems to Be the Motto of the Animals and Birds on This Page, and the Pictures Would Appear to Offer Proof That They Can Not Only See the Joke, but Are Able to Chuckle over It as Well; Above Is "Tom" Attending a Tea Party and Dressed Like a Girl; Someone Has Just Called Attention to His Costume; Left, a Happy Dog in the Midst of an Uproarious Outburst



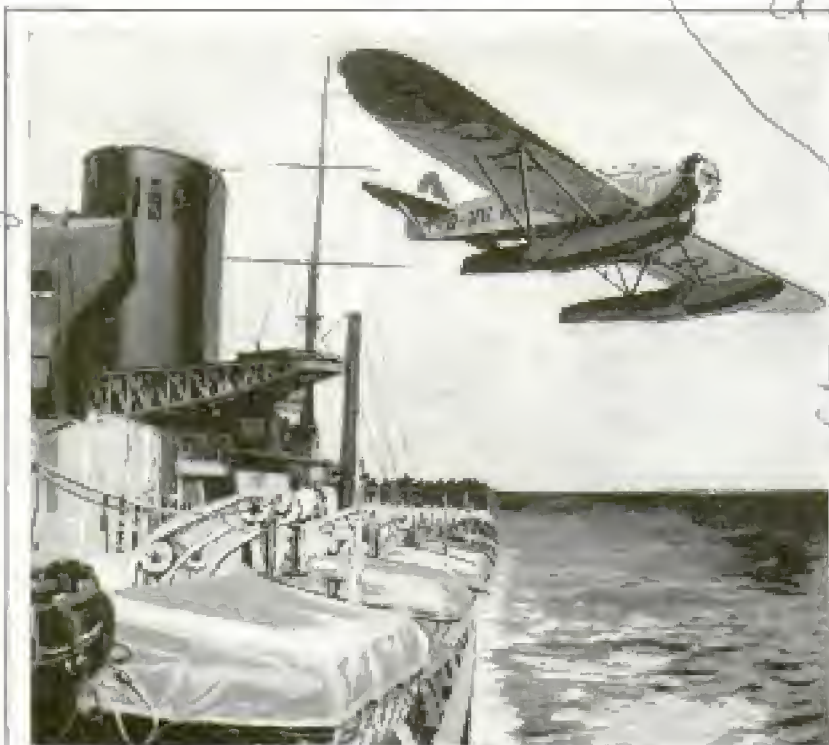
Is He Laughing or Crying? This Bull Pup May Be Either Hungry or Happy, but His Feelings Were Not Consulted When the Picture Was Made and His Expression Is Puzzling

"He Who Laughs Last Laughs Best," Says This Shoe-Billed Stork as It Indulges in What Appears to Be a Hearty Guffaw; the Bird's Opened Mouth Gives an Effect as Though It Were Laughing



a 1048
270

Perfected by Leon Hommel
Machine Works
340 Adeline St
Oakland, Calif
a 109
EXCELSIOR MADE
FROM PAPER



Air-Mail Plane Taking Off from Ocean Liner with Letters Which Will Reach Shore a Day or More Ahead of the Ship's Mail Cargo

SHIP-TO-SHORE AIR SERVICE AGAIN SPEEDS MAILS

Ship-to-shore air-mail service has been resumed on the Atlantic after having been tried and abandoned for further tests. Working on a definite schedule, pilots now take off from the speeding liners long before the coast is reached and land the mail for delivery a day or more ahead of the regular mail cargo. Improvements in catapults now insure a take-off at flying speed, with a minimum of shock to the plane and pilot.

SAME PLANT BEARS POTATOES AND ALSO TOMATOES

By grafting a young tomato plant on the growing roots of a potato plant, an interesting crossbreed that bears potatoes as roots and tomatoes as fruit can be developed to save space in the vegetable garden. The potato plant is cut off diagonally near the ground, and onto it is grafted a tomato plant also slit diagonally. Care must be taken that the parts of the plants immediately under the bark come in contact. The graft is wrapped with raffia, and it is not necessary even to cover it with wax, although this is desirable.

James Lambert, director,
Botanical Gardens, Univ.
of Pennsylvania, Phila

Any sort of paper stock can be converted into paper excelsior for packing purposes by a shredder made particularly for cutting up this and other similar materials. It also will cut alfalfa into chicken feed, chop cardboard into parts as fine as sawdust and clip rags into fragments for use in making roof material and other compositions.

EXTREMES AMONG WATCHES SEEN IN CHICAGO

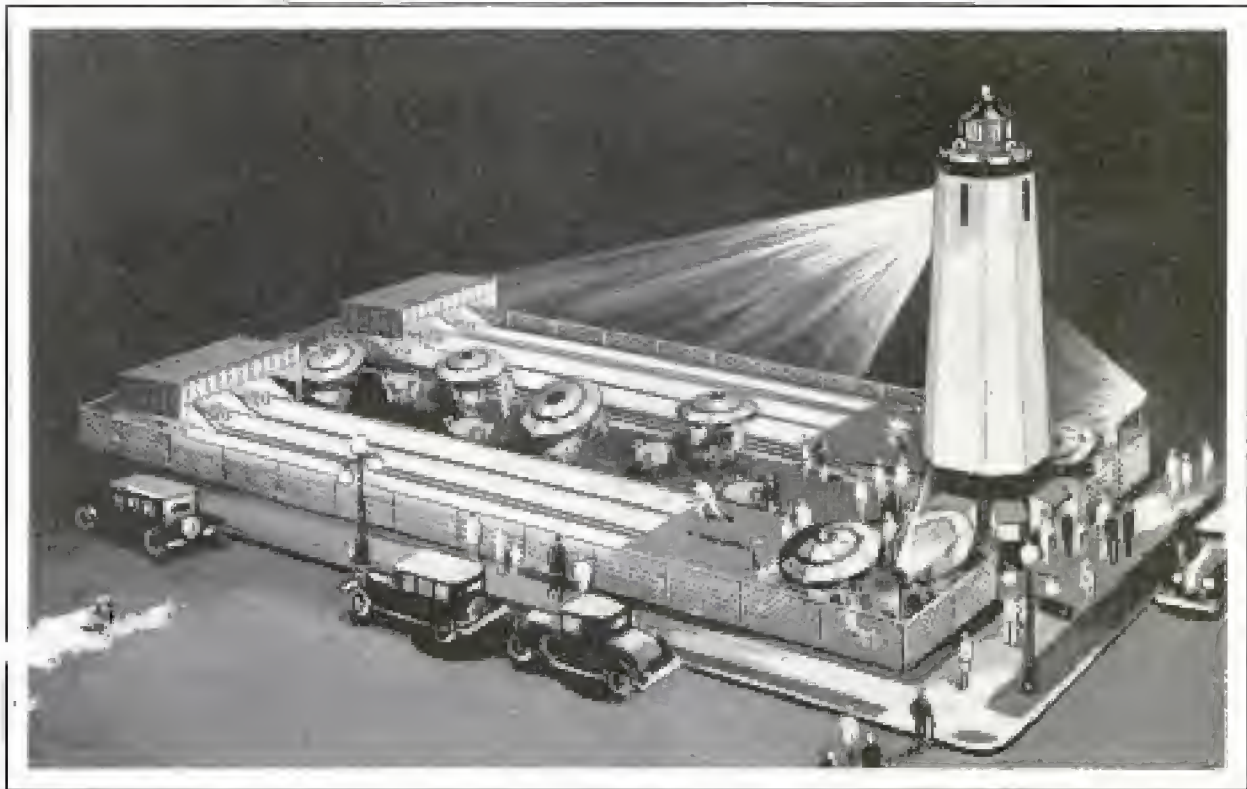
Giant and midget among watches recently passed the time of day in Chicago where both were on exhibition. Side by side they offered a striking contrast in timepieces, for the big watch weighs 550 pounds and the movement of the small one tips the scales at a quarter of an ounce. Both tick off the minutes



A Contrast in Watches; the Big One Weighs 550 Pounds, the Small Less Than an Ounce

accurately and both were brought from Europe to this country.

ANCIENT GAME MADE NEW FOR OUTDOOR SPORT



Outdoor Bowling Court with the Alleys Supported on Steel Piers; the Entire Equipment Is Weatherproof, and the Bowling Surface Is a Composition Material with the Resiliency of Wood

Bowling, which had its ancient origin on the green, again is being moved outdoors in the game of pin ball which is simply standard bowling played on a court in the open. The equipment is weatherproof since the courts are constructed of steel and the bowling surface is of a composition unaffected by rain, sun, snow or ice. The alleys come in sections and are supported by steel piers on top of which are leveling nuts to keep the surface al-

ways uniform. The composition can be highly polished but because of its dull color there is no glare from sun or from floodlights at night. Heretofore canvas canopies have been required to protect the alleys from sun glare and rain. Pin ball has no covers except at the pit for the purpose of deadening noise. The walls of the pit are steel-lined, and a swinging panel in front seals the pit when the courts are not in use.

AUTOS INTERFERE WITH RADIO SO HORSES GET WORK

Because the ignition systems of motor cars interfere with the reception and re-routing of radiophone calls, horses have supplanted automobiles in the vicinity of a big transatlantic telephone station in New Jersey. The station has been carefully located as far as possible from regular airways to eliminate interference from airplane motors, and only official cars, with shielded ignition systems, are permitted within a zone established about the station. Annoying background noises,

often serious enough to spoil radiophone communication, were traced to automobiles in the neighborhood. So the anti-auto rule was established, and horse-drawn vehicles now serve the station.

ULTRAVIOLET PROTECTION

Dangerous and invisible rays of ultraviolet light produced by arc welding are absorbed by a special paint developed for the covering of walls in rooms where such work is done. It is an oil-type paint, gray in color, and dries in about two hours after application.

Radio Press 35-16486
Cincinnati, Ohio

Bell Telephone Advertising
Station, Newark, N.J.

merchandise sleep
General Electric Co.
Chemist, N.Y.

a 1080

RIDERLESS HORSE RACING LATEST MEXICAN SPORT



Riderless Race Horses Closely Bunched on a Mexican Track; These Animals, Trained to Race without Jockeys, Stage Contests as Hard-Fought as When Urged on by Riders

Race horses, trained to run without jockeys, are attracting attention in Mexico, where this innovation in racing was made. Jockeyless racing puts the full responsibility on the animals. Spectators say that the horses, running by themselves, put up fast, hard-fought races, just as exciting to watch as the usual kind.

IS THE UNIVERSE EXPLODING ASTRONOMERS INQUIRE^{a 1126}

Is the universe actually exploding like a gigantic shell, flying to pieces at rates of thousands of miles per second, and doubling in size every 1,400,000,000 years? Astronomers now are trying to solve this problem, one of the universe's greatest scientific mysteries. Sir James Jeans, British astronomer, after a visit to Mr. Wilson observatory in California, revealed that a dual attack by scientists there may answer the question in a few more years. The basis for the theory is the discovery that the great nebulae or gigantic star groups are rushing away from the earth at terrific speeds, some as high as 12,500 miles a second. Whether the immense recessional velocities are real exploding motions of the universe,

or merely apparent effects that can be explained otherwise, still remains to be seen. Sir James explained that the stars are known to be millions of years old and thus the universe, if it has been exploding continuously, must once have been extremely small and compact. Explaining the size and structure of the universe, Sir James said that, if the farthest reach of the largest telescope today, a distance that would take light 140,000,000 years to cross, were only a mile, and 300 tons of apples were scattered seventy-five feet apart, each would represent a system of stars like the Milky Way in which our sun is but one of several hundred million.

COST OF BURIED POWER LINES ^{a 1066} LESS THAN OVERHEAD

Rural electric-power lines can be run underground cheaper than they can be strung on poles. This is shown in a recent report to the National Electric Light association and indicates that it may be possible for farming areas to enjoy underground electric distribution. The report urges underground construction of two-wire circuits that will not be changed to three-wire for some years.

Science Service 530.B
5/19/31

Science Service 529.C
5/13/31
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Cont. K. & L. Chute Box 400
 Route 4, Hayward Calif

Mr. J. E. Dougherty,
 University of California
 Berkeley, Calif

Q-1153

ICELESS STORAGE KEEPS EGGS WITH LITTLE SHRINKAGE

Using evaporating water instead of ice as the cooling medium, a storage bin for eggs has been invented by a California professor. It holds eight cases of eggs in stacks of four each, and is covered with burlap, treated to keep it from rotting. The burlap is kept moist by water fed from a tank on top of the cooler. The tank is connected directly to a water supply, and the level is kept constant by means of a float valve. In a test, eggs held five days in the cooler showed a shrinkage of four per cent, as compared with forty-two per cent for eggs stored outside.

NEON-TUBE LIGHTS FOR HOMES GIVE SOFT ILLUMINATION

Neon-tube lighting, which heretofore has been confined to signs and decorations, is now being developed for homes and offices because, aside from its economy of operation, it possesses a softness not found in other forms of illumination. Georges Claude, noted French engineer, has made a light for interior use that operates directly from low-voltage house current like an ordinary incandescent bulb. It consists of a coiled glass tubing containing a combination of rare gases and is about the size of the usual light bulb. It can be placed in the ceiling, on wall brackets or in table or floor lamps, and the specially prepared tubing together with the rare gases produces only the beneficial ultraviolet rays, the shorter and harmful ones being entirely eliminated.



Neon-Tube Light for the Home That Operates from House Current; the Reflector Is Unnecessary

Claude Henri Due
 Liggett Bldg. 42nd + Madison
 New York



Radio Compass Which Registers Direction of Any Broadcasting Station

RADIO COMPASS IS SO LIGHT ONE MAN CAN CARRY IT

Modern yachtsmen now can guide their vessels with the radio compass, an adaptation of the radio direction finder to boats. The apparatus is so light that one man can easily carry it about, and operates by picking up and registering the direction of any broadcasting station tuned in by the man in charge.

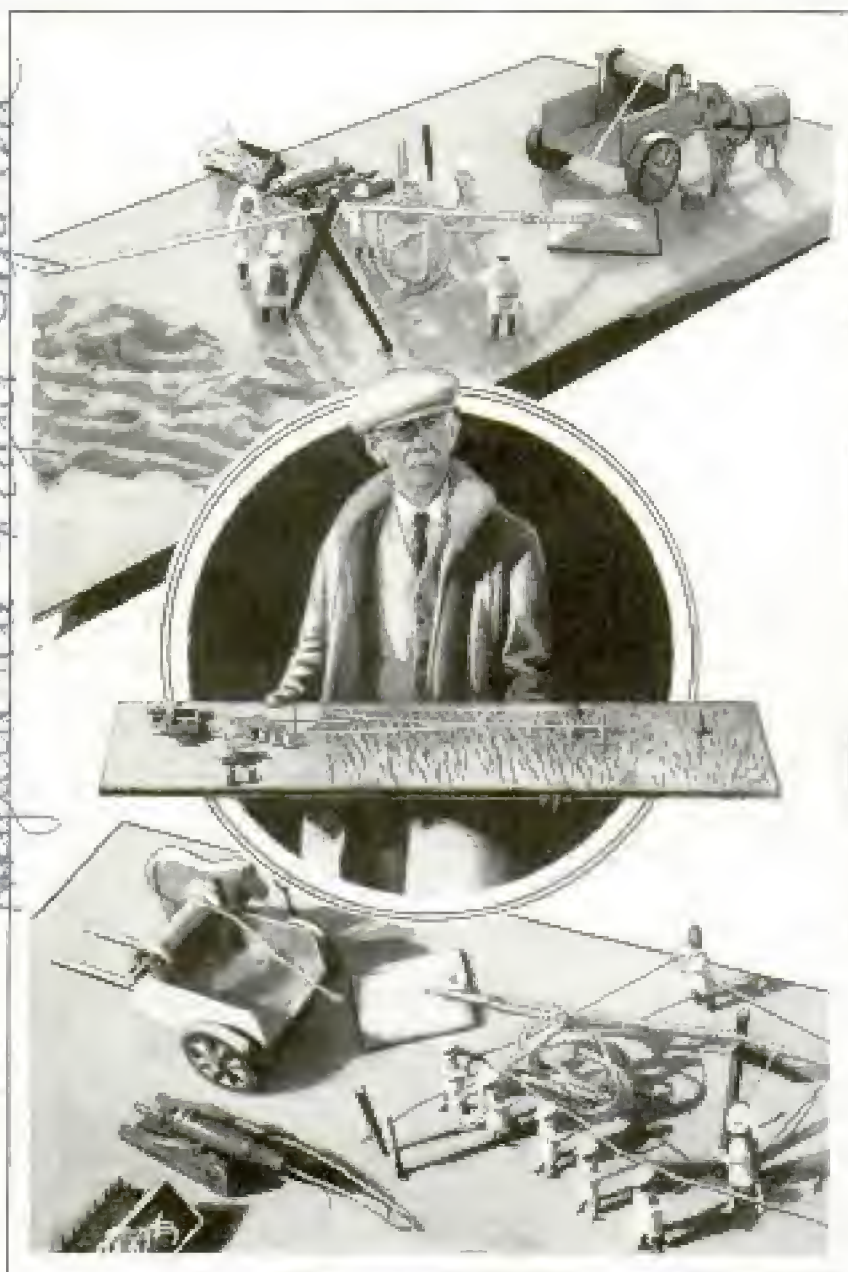
AIR BEACON ALSO IS "SUNDIAL" TO TELL TIME AT NIGHT

Using light instead of shadow to tell time, a giant nocturnal sundial is to be installed by the city of Guayaquil, Ecuador. An electric searchlight will revolve once every twenty-four hours and indicate the time by illuminating surrounding landmarks at the same hour each night. The clock tower is to be in the center of beautiful gardens now being laid out along the waterfront. A historic clock, built in 1841, will be housed in the structure, which will be of Moorish architecture. The giant air-beacon-searchlight clock will be mounted atop the tower.

About 50,000 Canadian farmers and other land owners are in the maple-sugar business.

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273
 Dr. W. S. Fisher, Research
 Eng. R. Radio Laboratories
 Broadway, New York
 A-118
 bought from
 Chulmar Bldg. Des. E. Co. 120



Model of a Shipwreck Built to Demonstrate the Operation of a Breeches Buoy; It Is Constructed on a Plank Five Feet Long

SHIPWRECKS MADE TO ORDER BY WORKING MODEL

A model of a shipwreck has been made for a weather recorder stationed on the tip of Cape Cod to aid him in answering the queries of curious visitors as to the operation of a breeches buoy. His model includes the wreck, the ocean, the coast-guard station and a breeches buoy that really operates. It is built on a plank, five feet long and one foot wide. A small sailing vessel is represented as having grounded on a sand bar, and is being pounded to pieces by the plaster-of-paris waves. On the shore, the coast guard is

shown in action with all equipment set up and the breeches buoy in operation. The cannon which shoots the lifeline is spiked in place, and the horse used to drag the beach wagon is tied up at one side in regulation manner. All members of the crew on ship and on shore are in their correct positions, the ropes are in order and even the tags used in giving directions in several languages are reproduced.

TELEVISION TRIED WITH WHITE LIGHT

With microphones installed in the audience chamber, a speaker in a recent television test at the General Electric laboratories heard queries addressed to him, which he answered by television. The test was conducted before an audience of 700. The speakers were placed in the laboratory of Dr. E. W. Alexanderson, in another building. An additional feature of the test was the demonstration of tel-

evision projected by white light, instead of the usual pinkish glow of the neon tube. The theater projection outfit designed by Doctor Alexanderson was used, and the television image thrown on a large screen in the conventional black and white shades, giving depth and detail to the image.

☛The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the bureau.

"READY" ROOM FOR FLYERS ON AIRPLANE CARRIER

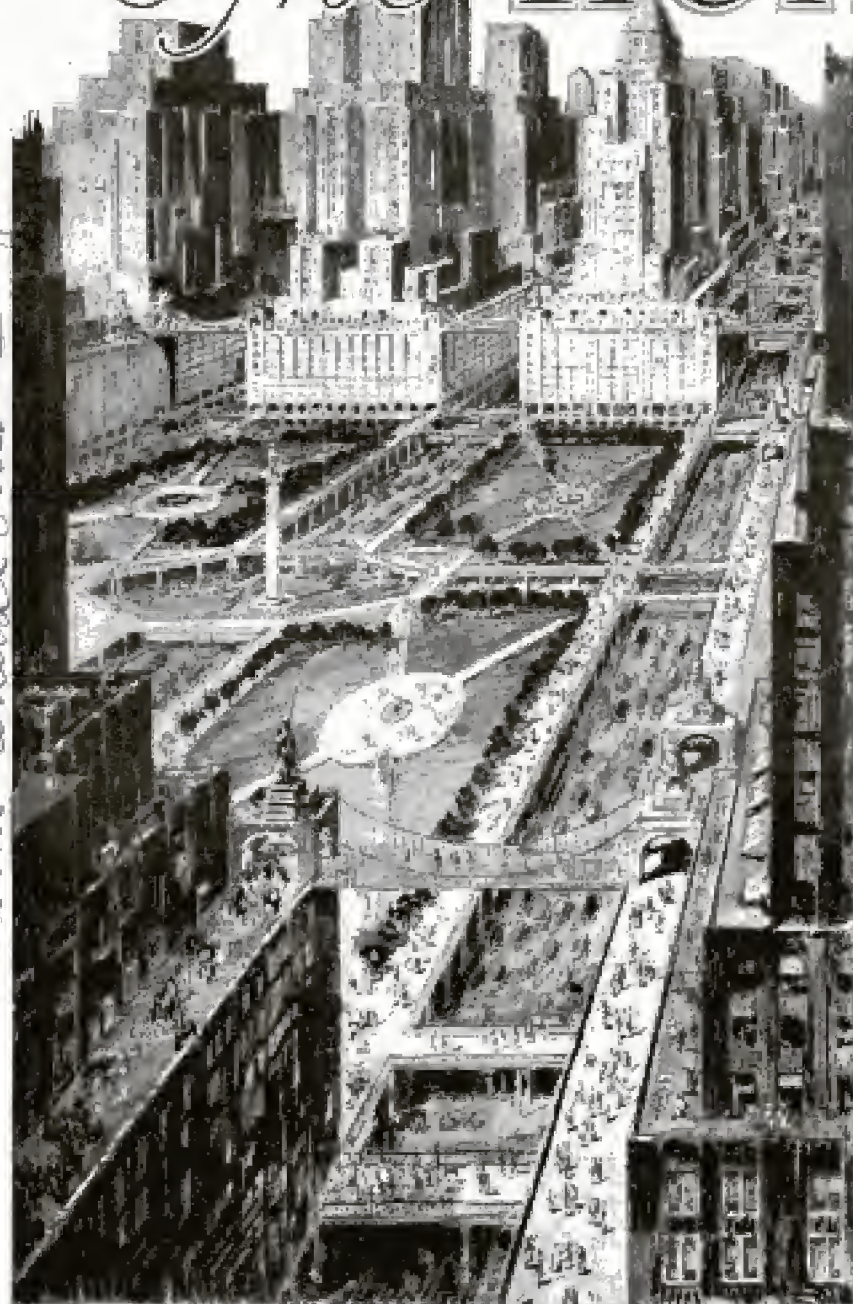


Views below Deck on Board the Navy's Airplane Carrier "Saratoga"; Above Is Shown the Aviators' "Ready" Room on the Ship Crowded with Flyers Preparing for Flights or Awaiting the Call to Duty; Below, Left, Aerographer Keeping Track of Meteorological Vagaries by Making the Daily Weather Chart for the Guidance of the Flyers; Right, a Corner of the "Saratoga's" Printing Shop Which Includes a Linotype and All Equipment of a Plant Ashore



a. 908 Cont. Hon. Classroom, New York
55 W. 16th St.

The HOME of



New York in 1930 as H. W. Corbett Pictures It; Ground Levels Will Accommodate Autos While Sidewalks Will Be Elevated

Architectural and Allied Arts Expositions after 18.25
Grand Central Palace

THAT the average American will live more comfortably and luxuriously, and at less cost, than he does today was the prediction at a recent architectural show in the east.

In 1910, the average person in this country consumed only six and a half kilowatt-hours of electricity; in 1920 he consumed nineteen and in 1930 he consumed forty-nine. Yet one can buy nine times as much electricity for one cent in 1931 as in 1890.

With all the recent improvements in the art of living, there is a crying need for many more. Before the days of centralized heating, houses were uncomfortably cold in winter, but today almost any home boasts an efficient heating plant.

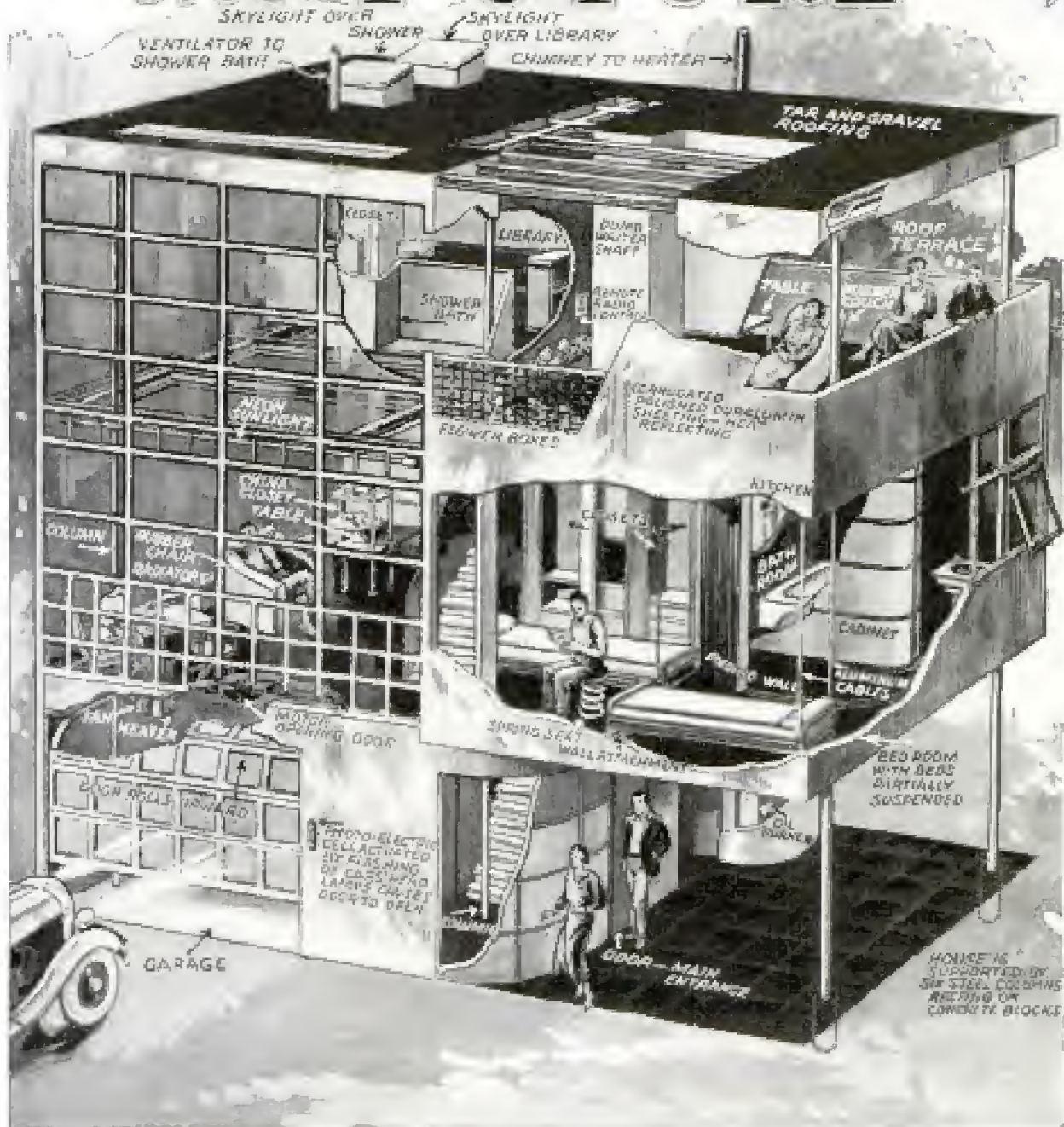
On the other hand, inventors have done little or nothing about making those homes comfortable during the hot summers. What is sorely needed in almost every section of this country is a moderate-priced system to cool and purify the domestic atmosphere in the hot season. This is one of many improvements which mankind waits.

It is hard to conceive how our fathers endured the inartistic homes and appalling discomfort of fifty years ago. Dinner tables rolled on squeaky casters; bathtubs were curios; housewives swept with germ-breeding brooms; the shower bath was unknown; factories belched black smoke; scraggy horses dragged street cars; gas lamps lighted the home; theaters were fire traps and unventilated; traveling other than by railroad was a great hardship; window screens were unknown; hordes of flies polluted food and pestered sleepers, and business thoroughfares were obstructed by unsightly poles weighed down by telegraph wires.

The present year long will be remembered as the time the world's first all-metal home, built to full size and completely equipped, appeared fresh from the draft-

Designed by U. Lawrence
Kocher and Albert
Frey, 4 Park End Place
Long Island
N.Y.

the FUTURE



Also Sept 1922 353

Drawn by Logan U. Beares
Cut-Away Representation of the Home of the Future; the House Is Constructed Entirely of Metal and Glass, with the Latest Space and Labor-Saving Features

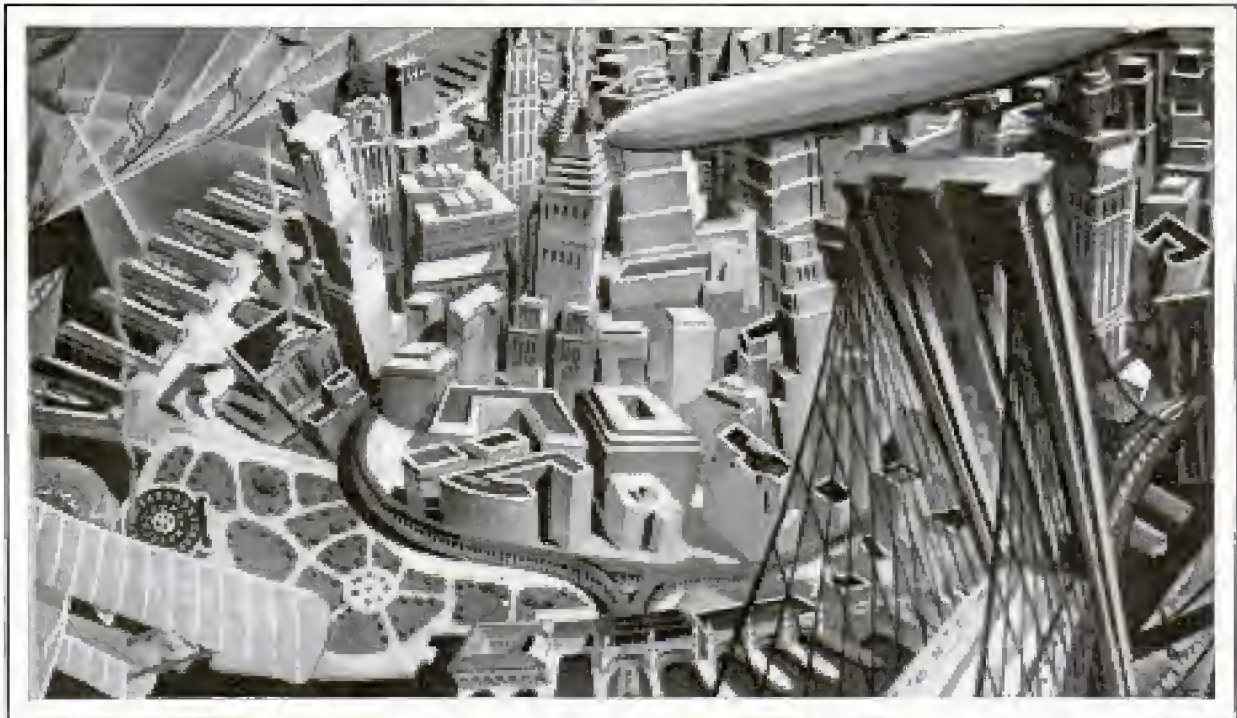
ing room, the foundry, laboratory and the brain of man.

As it stood at the exposition, this house represented the effort of centuries, although it cost only \$4,000.

The ground dimensions are twenty-two by twenty-eight feet and the height is thirty-five feet. The house has no basement, because, according to the architect, basements are hold-overs from the days

before mechanical refrigeration, when foods were kept cool underground.

As for convenience and comfort, this house embodies almost everything man has so far devised to add to his ease. It might be regarded as a sort of museum of domestic invention. The architect conceived it on the principle that moderns want luxury at moderate prices, not merely quaint, vine-clad cottages.



"Downtown," a Mural Depicting Three Different Districts of Manhattan; the Painting Is Modernistic in Keeping with the Architecture and the Interior Decorative Scheme

The exterior walls are sheets of corrugated aluminum, and have insulation which makes their three-inch thickness more weatherproof than the ordinary thirteen-inch masonry wall. All materials in the house are now easily obtainable, and yet the house neglects all past standards of building. It is a house such as men on some other planet might build, yet undeniably American.

In construction, it resembles our modern skyscrapers. Six slender aluminum

columns, within the house area, support cantilever beams from which the outside walls are suspended, as opposed to the ordinary house where the outside walls support the inside structure. Windows may be located wherever it pleases the owner, and inside partitions, likewise, may be shifted about to suit the individual taste.

Aluminum-alloy columns bear the main load. The steel deck floors are rigid, but the visitor does not know he is walking



The Temple of Music, One of the Beautifully Modernistic Buildings Now in Course of Construction for the World's Fair at Chicago in 1933

© Norman Het Geddes

on steel, for the floor covering is linoleum or a sponge-rubber composition.

Windows that pass ultraviolet light extend the full length or height of the room. Even the roof may be converted into a sky window.

The main living room is duplex and extends the width of the house. The dining table has an "elastic" top which rolls up like a window shade.

A long neon tube, hung over the window top, illuminates this room so that the light comes from the same direction at night as by day.

By turning a dial, one may have either white, ultraviolet, or a selection of colored lights. The living room also has a sun-ray lamp and radio.

On the top floor the library is illuminated by a sky window. A wall case and built-in case are made entirely of glass. From the library one passes to the roof terrace. By means of an ingenious folding partition, the whole living-room floor can be made into a single room with a twenty-two-foot window. In this way the architect provides for a spaciousness rarely found in small homes. The twin beds in the master bedroom are not side by side, but at right angles.

A single dumb-waiter serves almost every room in the house.

Interior walls are extremely light sheet steel, only two and one-quarter inches in their over-all dimension. Three types of windows are used; the monumental, the casement and the curved bay window.

An asbestos insulation board insures smooth wall surface and noise-proof chambers. The kitchen has a special perforated sound-absorbing ceiling. Bath and shower rooms are faced with opaque and polished vitreous-slab material.

☐ In telephoning from New York to San Francisco, the voice must be "boosted," or increased in volume, thirty-six different times.



Above, "Salamanca," the First Commercial Locomotive; Below, Growth of Rails to Match Power Development

HOW LOCOMOTIVES "GROW UP" IS SHOWN BY RAILS

Keeping pace with the development of larger and faster locomotives, American railroads are adopting the 152-pound rail, said to be the heaviest in the world. Most roads handling heavy and fast traffic now use the 130-pound type, but at least one company already has adopted the 152-pound stock, capable of sustaining 100,000-pound axle loads and much higher speeds. It is also said to possess seventy-five per cent greater stiffness or strength. Development of this nature was demonstrated at the opening of a permanent exhibition in New York, showing exact scale models, including one of the first locomotives to be used in regular commercial work. It was the "Salamanca," built in 1815, and for which a cog track was necessary.

Pennsylvania

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Ant. Stanley W. Todd 230 Park Ave. New York

Q-1130

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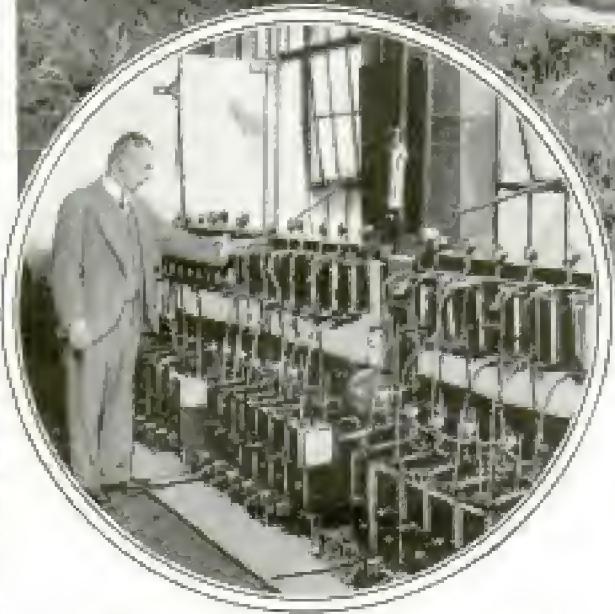
Carl. Beran om Linderi Lardner -
2205 Calhoun Place Los Angeles

218 W. Plymouth St. *Only*

BREAKING 'EM UP TO MAKE THEM BETTER FOR YOU

Longwood Calif

*Some Commenced Industries equipped at factory
A.C. Air Cleaner and Carburetor Science*



Above, Car Ready to Enter Wind Tunnel for Air-Cleaner Test; Left, Testing Oil Filters

"A million tests a year," states one manufacturer of automobile accessories; "ten thousand a month," vies another, and the purchaser is the one who profits because nothing is left to the chance of failure in operation or on the road. When you tell the salesman, "I'll try that thing out," he can well afford to smile, knowing that it already has been subjected to harder tests than it will ever receive from the ultimate user. An air cleaner which prevents grit and other foreign matter from entering the engine through the carburetor, is tested in a dust tunnel, through which, under pressure of a powerful blower, dense clouds of dust are driven against a standard automobile in greater concentrations than are likely to be encountered on any modern road under normal conditions. Oil filters, taken at random from routine production, are given thorough tests not only for efficiency, but for dur-

ability and life. One of the more interesting tests is that given fuel pumps. One manufacturer has already operated a pump through its 300,000th mile in test. Speedometers are tested on vast boards, at all the average automobile speeds and many of the higher speed ranges, up to half a million miles. The continued improvements in spark plugs, and the development of new materials, are made possible by photographically recording a portion of the spark that occurs in one-millionth of a second. Spark-plug insulators are tested and hardened simultaneously in a huge tunnel kiln, where they are fired at a temperature of more than 2,400 degrees Fahrenheit. Day and night engineers are seeking ways to break up things you use so as to make them better.

VALUE TWICE THAT OF GOLD, AMBERGRIS IS RARER

Q-1176

Ambergris, the evil-smelling material found in sick whales, is becoming so scarce with the ever-lessening number of the huge sea mammals that it has recently been quoted at double the price of gold. Despite its evil odor, it is essential in the

Carl L. W. Fickler
5021-12th Ave. S.E.
Seattle Wash

*Myer-Hodge, Alcott
to the museum*

See Jan, 1928-43

A 103 4

*July 1922-95
180 Varick St.*

manufacture of perfrumes,
no satisfactory substitute
as yet having been found.
Another thing: amber-
gris is not amber, it's
gray or black in color,
and is found most com-
monly in the Indian and
Antarctic oceans. Often
pieces of it will break off
the whale and wash
ashore. Masses, varying
in size from an ounce to
250 pounds, have been found float-
ing on the surface, or washed on-
to the beach, and have made their
discoverers wealthy overnight.



*Los Angeles only
Herron*

**PLANE CRUDE-OIL MOTOR
HAS DOUBLE PISTONS**

Experiments recently have been
conducted in Germany with an
airplane motor that uses crude
oil for fuel. Its employment has forced
the design of a large motor of unconven-
tional appearance, one of the unusual
features being the double pistons. Each
cylinder has two pistons moving in op-
posite directions.

Expert Lens Grinder and Some of the Lenses of Odd Shapes That Produce the Unusual Effects in the Movies

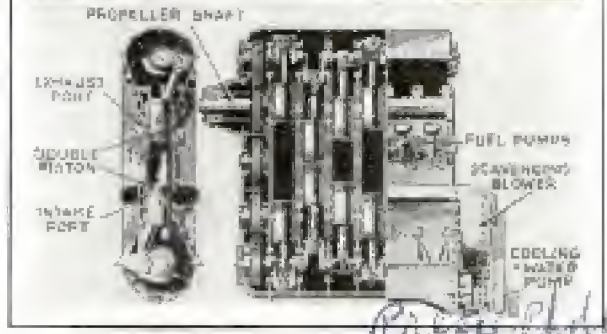
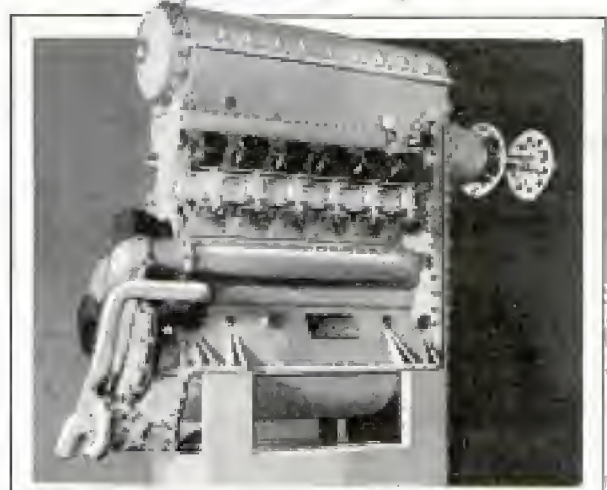
**QUEER MOVIE EFFECTS RESULT
OF ODD-SHAPED LENSES**

Many of the unusual photographic ef-
fects in moving pictures are produced by
specially ground lenses and prisms. A
great many of these lenses of odd shape
are polished and ground by hand in the
little shop of one Los Angeles artisan,
who works from plans executed on paper.
One of his latest achievements is a lens
which makes seven separate images on a
motion-picture film simultaneously.

James

**APPLES SAVED BY ELECTRICITY
IN COLD-STORAGE CAVE**

Electrical cold storage for an apple
cave has solved the problem of one Iowa
orchardist in preserving his surplus crop
at picking time. A cave, large enough
for a team and wagon or a truck to en-
ter, was dug in a hillside and in it was
placed a small refrigerating machine.
Loads are driven in on a ground-level
floor, and, after sorting, the apples are
lowered into the cave proper. In the
winter the temperature is regulated with-
out artificial means, but with the advent
of warm weather the storage plant, op-
erated from a near-by power line, keeps
the fruit until higher prices offer a de-
sirable market.



Airplane Motor That Uses Crude Oil for Fuel; Note Double Pistons for Each Cylinder

*Junkerswerke
Dresden Germany*

*J. W. Carter
Copyrighted material
Lawa*

*Installed by the Forest
Radio Co. Passaic, N.J.*



Fireman Testing a Life Net by Leaping into It from the Top of a Ten-Story Building; He Landed without Even a Scratch

TEN-STORY LEAP INTO LIFE NET OFFERS UNUSUAL PICTURE

When the Los Angeles fire department recently received a consignment of life nets, the firemen decided to test one of them, and a volunteer offered to jump from the top of a ten-story building. The cameraman was ready when the fireman made the plunge, and the resulting picture might be termed a bird's-eye view of a thrilling fire rescue, since the jumper reported no bad effects from the leap.

HOTEL FRAME GIANT ANTENNA FOR RADIO TO ROOMS

Using the framework of the hotel itself as the antenna, and feeding radio programs to rooms by retransmitting the impulses from small broadcasting apparatus, a Washington hotel has installed di-

rected radio which makes the entire building a veritable giant radio set. The saying "Sermons from Stones" thus has turned out to be no based entirely on fancy. A master receiver is located in the building, connected to a single aerial and receiving four programs at the same time. The programs are retransmitted to four small broadcasting units, which pour the waves into the steel framework of the building. Highly simplified receiving sets, requiring only an electrical power connection and a ground, are placed in each of the rooms, and guests may tune in any of the four programs.

NEW SAFETY FUEL IS PROOF AGAINST LIGHTED MATCH

By means of a special process of hydrogenation, a safety fuel has been produced for automobiles and airplanes, as incombustible as Diesel oil yet as powerful and as productive of engine performance as good aviation gasoline. A lighted match can be tossed into this fluid without igniting it, and hence it is expected to help prevent fires that often follow upon crashes of gasoline-engined airplanes. To use the fuel, which is not yet on the market, it is necessary to replace the conventional carburetor with an injection pump, but the explosive mixture within the engine cylinder is fired by electrical ignition rather than by compression as in the Diesel engine. With such a liquid it is possible that the problem of providing aircraft with safer fuel may be met by an adaptation of present internal-combustion engines rather than a complete change to the Diesel type. The fuel is yellow in color, contains less sulphur and does not gum as readily as ordinary gasoline.

Hotel Lincoln

*Demonstrated at
National Advisory Committee
for Aeronautics*

done by the Forest Radio Co. Passaic, N.J.

Q-1200

NEW SAFETY FUEL IS PROOF AGAINST LIGHTED MATCH

By means of a special process of hydrogenation, a safety fuel has been produced for automobiles and airplanes,

Science Service 5/25/31

Write Quartermaster General of
Washington or Adjutant General

a 1058 Cont. Wilbur H. Rose
3608 Lularoa St.
El Paso, Texas

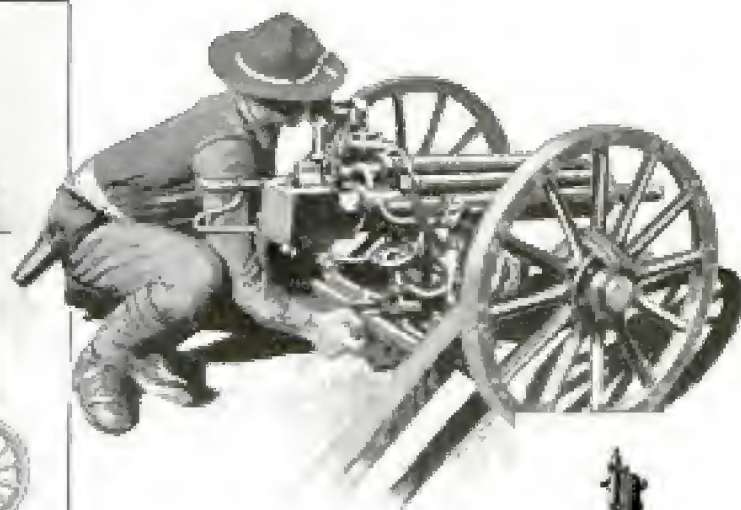
POPULAR MECHANICS

283

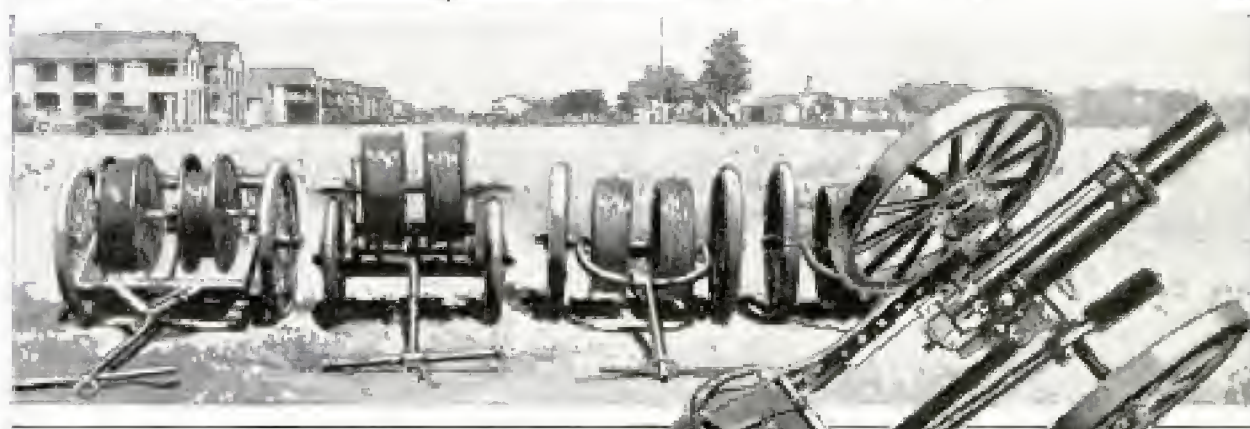
THE LATEST WEAPONS OF UNCLE SAM'S FIGHTERS



Above, Army Kitchen on Wheels So Built That Cooking for 250 Men Can Be Done While It Is in Motion: Below, Electric Grooming Machine for Currying Horses



Above, Anti-Tank Gun with Well-Balanced Carriage, Which Makes It Easy to Train the Weapon on a Moving Target; Right, Semi-Automatic Rifle That Is Gas-Operated to Decrease Shock of Firing; It Weighs About Nine Pounds and the Magazine Holds Ten Shells



Above, Experimental Models of Reel Carts; Each Reel Carries About One Mile of Wire Which Weighs 165 Pounds; Right, Wheel-Mounted, Breech-Loading Mortar Used to Fire High Explosives, Gas, Shrapnel and Smoke Shells

HOW FAR CAN A FROG JUMP ANSWERED BY RACE



Above, Crowd in Old-Time Costumes around Some of Entries in California Frog-Jumping Contest; Left, Jumper Atop His Traveling Case



HANDLE CAREFUL JUMPING FROGS RUSH QUICK
ON OUR WAY TO THE
JUMPING FROG JUBILEE

Frog-jumping contests are vying in popularity with turtle racing. In the fourth annual frog-jumping jubilee staged by Calaveras county, California, the winner repeated his victory of 1928 with a leap of eleven feet and five inches. The second in a field of 150 entries from all

parts of the country was only four inches behind the champion. Crowds in old-time costumes attend the hopping contests, and entries come from all parts of the country where the frogs are groomed carefully for months by their backers.

91083

SOLUTIONS OF PUZZLES FILED IN THE PATENT OFFICE

Patents for 481 "useful puzzles" have been granted to inventors who have shown how to solve their mystifying creations. No patent can be awarded a puzzle, no matter how fascinating, unless its solution can be filed away for reference, along with the puzzle itself. In order to qualify for a patent, a puzzle must be useful. The first puzzle to be patented was of the "take apart and put together" type, for which a patent was issued in 1863. This seems to be the most popular type, as patents have been awarded for 103 of these jigsaw puzzles.

H-S Hardy

5/16/21

Copyrighted material

at Angels Camp

Chicago Daily News
5/16/31 A 1133

TRADE IN BROKEN EGGS GROWS

Egg breaking and the powdering of yolks and whites of egg has become an American industry, with more than \$2,000,000 invested in it. About 11,000,000 pounds of egg powder are used in the United States every year in the making of noodles, ice cream and cake flours. At present most egg powder is imported from China, but American producers are organizing to foster the native industry.

PEBBLES FROM SKY MYSTIFY SCIENCE

Scientists are mystified by the formations of a literal shower of pebbles which fell in widely separated localities in Ohio during a hailstorm. Most of the pellets were almost round, about the size of marbles, and smooth. Some appeared to be hard, opaque stone, while others were of frosted crystal and so hard that glass could be cut with them as with a diamond or the hard steel used for cutting tools scratched.



Handfuls of Pebbles Which Fell during a Hailstorm; Their Composition Has Mystified Scientists



Riding the Surf at Night by the Light of Flares; the Rider Is Holding the Towline in His Mouth and Grasps a Torch in Each Hand

EERIE RIDERS OF THE NIGHT CARRY FLARES OVER WAVES

Aquaplane riders who do not find enough excitement in being towed at high speed behind a motorboat by day when the hazards can be seen, now are riding the surf at night. One California surf rider attaches his craft to a speed boat after dark, holds the towline in his teeth and in each hand grasps a sparkling flare to light his way, presenting an eerie figure as he skims over the water.

PHOTO BETWEEN HEART BEATS TAKEN BY X-RAY CAMERA

X-ray photographs made of the chest cavity ordinarily are blurred slightly by the throbbing of the heart. To eliminate this trouble, University of Pennsylvania research specialists have developed an X-ray camera which works on the principle of the between-propeller type of airplane machine gun. Several short exposures are made between beats so as to produce a clear, composite negative.

Charles W. Moore
School of Electrical Eng.

Elmer E. Pack, Venice, Calif.

Chicago Trib., 5/12/31

SAFE-GUARDING NATION'S FORESTS FROM THE AIR



Above, Air-Express Plane Flying over San Bernardino National Forest in Southern California; Pilots of Such Ships Last Year Detected and Reported Twenty-Four Forest Fires Here



Above, Pilot of a Transport Plane Reporting a Forest Fire by Radio Telephone; Air-Route Flyers Are Helping Conserve California's Forests by Watching Constantly for Such Fires



Above, Chief Dispatcher of Angelus National Forest with Map on Which All Reports of Fires Are Checked; Right, Dispatcher at Airport Receiving Radio-Telephone Report of Forest Fire from Pilot; He in Turn Will Notify Forest-Pre-serve Officials



Division of music

A 1145- Cont. N. 8

Indis.
287
Jaffin, Ind

POPULAR MECHANICS

CONGRESS COPIES OLD SONGS FOR LIBRARY

Photostats, photographs on non-inflammable film, phonograph records, and even the experimental telegraphone which records words and music on piano wire, are being employed by the library of congress to make a complete record of American folk songs from all sections of the country. Wherever possible, the music is recorded from the section of the country in which the song is predominant. The library executives have obtained numerous private collections, original manuscripts and unpublished songs of this type for copying.

SCHOOLS OF TUNA ARE LOCATED BY THERMOMETER

Discovery by means of thermometers of many new shoals along the Pacific coast, has helped to revive the albacore, or white-meat tuna, fishing industry, threatened with extinction the last three years by failure of the fish to return to their former haunts. Although the shoals are too deep to cause trouble for boats, they have been well-defined through the differences in water temperature. Sounding the depth with ordinary means is too slow to allow the fishermen to cover sufficient territory. It has been found the colder water is deflected upward by the rising ocean floor, so that when the fisherman strikes a section of cold surface water, he knows the shoals are beneath. Many new banks inhabited by the albacore thus have been discovered.

¶The trade value of a wolf skin in Montana sixty years ago was two cups of sugar, and a beaver skin was worth half a cup.



Whole Section of Horse-Drawn Artillery Is Ferried across River on Motor-Driven Pontoons; Top, Two Sections of Motorized Ordnance Land

OUTBOARD MOTORS AID TROOPS TO CROSS RIVER

Using outboard motors to propel pontoon rafts, two whole batteries of United States artillery were taken across a river under protection of a dense smoke screen, in tests near Ft. Hoyle, Md. The rafts were equipped with aluminum pontoons, while small boats accompanying the guns laid down the smoke screen. It was found that the two batteries could be taken across the river in six trips, thus making it possible for an advance guard of light artillery to be thrown hurriedly over a body of water, while the "heavies" waited for a bridge to be constructed. The rafts were capable of handling two sections of motorized artillery or one section of horse-drawn ordnance including a gun, caisson, limbers and its complement of thirteen horses, at one load.

U.S. Daily 6/21/31

A 1225

A 1208

Cont. Thomas J. Keeney
4104, Utah H. San Diego

ELECTRICAL FAN MILES HIGH FORMED BY SEARCHLIGHTS



Dazzling Shaft of Brilliance Formed by Converging Beams of Twenty-Four Searchlights

Opportunity for an unusual night picture was afforded by a recent searchlight drill at Fort Shafter, Honolulu, when the beams of twenty-four powerful lights were massed together for a display of dazzling brilliance. The scene showed a white shaft of light extending far into the sky with a fan-shaped effect at each side. Action was afforded by airplanes which dodged in and out of the massed lights at an altitude of 15,000 feet.

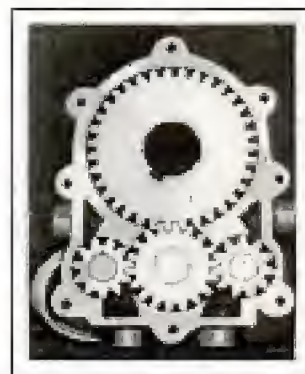
SHEET EROSION BIGGEST CAUSE OF LAND DEPRECIATION

Sheet erosion, the unending process which steals a part of the top soil every time there is rain enough for water to run downhill, is a major cause of land depreciation, but because it is more gradual and less noticeable than gully washing, it

is not considered so damaging. H. H. Bennett, soil scientist of the department of agriculture, estimates that excessive washing has virtually destroyed more than 17,000,000 acres of formerly tilled land, and adds that there is a vastly larger area whose surface soil is slowly but surely being washed thinner and thinner by every rain. As a result, despite the benefits of research and extension services, crop yields are not increasing but, in fact, are decreasing in many localities. Land impoverished from overcropping frequently can be made productive, but land worn out by erosion is hopeless, because the top soil contains the elements necessary for plant growth. Erosion can be halted or decreased, it has been found, by better land utilization, better protection of cultivated slopes with terraces and by other means, and the use of certain lands for forests to prevent the rapid erosion brought about largely by the fact that the land has been stripped of its stabilizing cover of trees, forest mold, grass, bushes, etc., and further weakened by excessive cultivation and the trampling of stock, both of which expose it to rain wash.

GEAR PUMP FOR OIL PREVENTS BURNED-OUT BEARINGS

For lubricating line shafts on railroad cars or automobiles, a minister of an inventive turn of mind has made a gear pump for oil, the meshed gears bringing up the oil by suction to prevent "hot boxes" on trains and burned-out bearings on cars. The pump throws two streams of oil and, when used on railway cars, does away with the waste in journal boxes, oiling the axles through the journal. The pump is operated by the wheel, and it is estimated a quart of oil will last six months. On an auto, the pump is operated by a battery and throws two streams of oil on the bearings to keep them lubricated at all rates of speed.

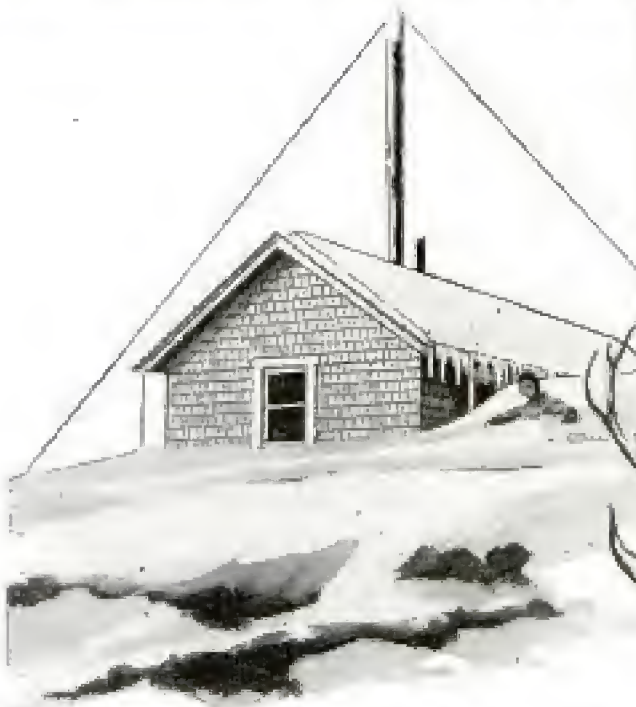


at meeting of American
Forestry Association
at Asheville N.C.

a-1196

U.S. Dept. of Agriculture
Press Service

Mr. Father Joseph
M. Ryan, 513
Chicago, Ill. Chicago, Ill.



Above, Radio Station at Kanakanak, Alaska; Upper Right, Mail Plane Stopping There; Below, the Reindeer Which Is Beast of Burden, Food and Pet



Kanakanak, Alaska, is just about as far northwest as one can travel and still be on the North American continent. It is a radio paradise where stations from many parts of the world roll in over the loud speaker. It is a queer and quaint country with weather milder than in northern Wisconsin and a land where dogs are draft horses and reindeer are both pets and cattle. On the long waves, Italy, Germany, England, Russia, Japan, Australia and the United States come in every day with little variation of signal strength day or night. The closest broadcasting station is at Anchorage, some 300 miles east of Kanakanak. The closest amateur short-wave station is in Unga, on the island of the same name, four hundred miles to the south. Flies, so small as to be almost invisible, are the worst pests. They are called "No See Ums" and bite with ferocity, leaving welts. During the winter the radio operators trap foxes and mink in off hours, ski, snowshoe and go dog driving and hunting. The long winter evenings are spent listening to radio programs. Each dog is fed one fish a day and that only at night after he is through work. They are chained outside with no shelter, and sleep in the snow.

This may seem cruel, but if they are fed more they either get sick or else dig holes and bury all but the one they eat. They will not stay in boxes for shelter, preferring to live and sleep in the open even in storms. There are only a few hours of daylight in winter. The sun rises about 9:30 a. m. in December and sets again shortly after three o'clock in the afternoon. Farther north it rises even later and sets sooner.

HOW TO WATERPROOF MATCH

Matches can be waterproofed by dipping the heads in a creamy solution made by dissolving shellac in denatured alcohol. Thus treated, they can be used by hunters, fishermen, or others engaged in outdoor work or play, in damp weather when ordinary matches absorb so much water they will not ignite. The waterproof coating dries quickly.

*Cont. L. H. Benji
 Edwin J. Lantry, Editor
 Dayton, Ohio*

Coul. John Winters Fleming
204 Voorhees Ave

290

POPULAR MECHANICS

Buffalo, N.Y.



Stringing Bags of Sand on Power-Transmission Lines to Test Strength of the Steel Towers

STRENGTH OF TOWERS TESTED WITH HEAVY SANDBAGS

To test the ability of steel power-transmission towers to withstand the stress and strain of midwinter sleet and wind on the wires, one electric company strung more than 500 bags of sand, weighing twenty-five tons, along the line, then exerted a side strain of five tons. The weight of the sand was equivalent to the pressure of one-half inch of ice completely covering towers and wires, and the side pull equaled the force of a sixty-mile gale. The towers apparently were unaffected by the double strain.

CHERRY BLOSSOMS AS A FOOD ARE RICH IN VITAMIN B

Two Japanese doctors of the Osaka hygienic laboratory have determined that the blossoms of cherry trees, lotus flowers, dandelions and other plants are exceptionally rich in vitamin B. If it were practicable, these scientists contend the best way to obtain this important vitamin in concentrated form would be actually to eat flowers. In Japan, for instance,

cherry blossoms seasoned with salt, are considered a delicacy, but their dietetic value was not known heretofore. Tests have been conducted with birds which were fed leaves, flowers, twigs, roots and peelings, and from these experiments it was found the flower of a plant contained the most vitamin B, followed in order by leaves, roots and stems.

TRUCK MEASURES ROAD SHOCK FROM BUMPS ON WHEELS

Federal engineers are taking the bumps out of the highways by means of instruments which register the shock impact when a wheel comes in contact with an obstruction, and the drop impact when it hits the pavement after the bounce. Elimination of uneven surfaces on highways is expected to increase the safe speed of automobiles, trucks and busses. The vehicle used to iron out bumps and measure their interference is a bus chassis equipped with a special body, the floor of which is divided into small compartments, each containing a 100-pound iron weight to vary the load. Various types of tires and rims are employed and the obstructions range from one and one-half inches high to rectangular plates twelve inches wide. The magnitude of impacts is measured by a multiple-element contact accelerometer, consisting of ten sensitive elements.



Truck Equipped for Measuring Shocks from Bumps; Small Compartments Hold 100-Pound Weights

Coul. Kenkichi Katayama
47 Sanjyosho, Nishinomura
near Osaka Japan

Bureau of Lighted material
Public Roads

test made by New York Power & Light Corp.

Osaka Japan

Coul. Earl W. Hoag, Ashville, N.C.

A. 903 Cont. Thomas E. Stinson, Jr.,
145 S. Spring St
Los Angeles, Calif

Gold Still Lures Prospectors

THREE years ago a mining engineer took a short cut through the Nevada hills. Using old trails and foot-paths, he traveled 150 miles without seeing a soul. A few months ago he made the same trip. This time he found prospectors at every turn. Nearly a thousand were camped in the washes and hills, panning the gravels and chipping at outcroppings.

It is estimated that in California alone, 10,000 people are looking for gold. Some are old prospectors, but most of them are making their first trips. Everywhere the search for gold has started again.

Has all the gold in the United States been discovered? Mining men do not think so. They point out that some of the richest finds have been made in districts that have been prospected for years. The 1927 gold strike at Weepah, Nev., was made on ground that had been worked over for forty years. Deposits of other precious metals are sometimes overlooked, too. Years ago a railroad was built to the Randsburg mining district in California. One cut through a hill exposed a rich vein of tungsten ore that was more valuable than most gold ores. But it was a long time before some curious individual chipped off a specimen and had it assayed.

The fabulously rich Kelly-Rand silver mine was found only after hundreds of miners had worn a smooth path across the outcropping, walking between a boarding house and another mine. For years the ore was only a place where miners stubbed their toes.

Not only do engineers think that new gold deposits will be found, but they say valuable discoveries may be made very soon, perhaps this year. They recall that



Here Is a Prospector with His Pan Washing the Gravel in His Search for Gold as Thousands of Old-Timers Have Done

after every business depression, accompanied by a fall in the price of silver, thousands of men have gone out to comb the western hills. In the past, each of these searches has revealed bodies of ore that were previously unknown.

A complete prospecting outfit consists of several sizes of basinlike pans, an iron mortar and pestle, a magnifying glass, bottles of quicksilver and muriatic acid, a square of chamois, a pick and shovel, supplies, and perhaps a dry-washing machine. Those who carry a complete outfit usually travel in a "tin burro" or stripped-down car in which they can reach seemingly inaccessible spots. Others travel on foot, alone or with a burro, some carrying only one pan with which to prospect.

Placer gold is found in river sands and gravels, and gold ore is found in the hills. What a prospector looks for depends upon the surroundings. Placer gold is loose

Prospectors Field Book and Guide
Isborn - Von Bernentz \$3.00.

Pans, hammers, pickets etc.
Shelley of 46 Chambers Denver, Colo

364 1/2 57 plus
pickethumbstyle



To completely separate the gold from the black sand would be too long a task, so the prospector drops a small amount of mercury into the pan and swirls it. The mercury picks up

and consists of tiny specks and grains, with sometimes a larger nugget. Coming across a likely-looking stream, the prospector proceeds to pan for "colors." Gold is rarely found in the pools or at the bends of a river. The wise prospector fills his pan with gravel from a point or a bar. Some prospectors use nothing but a frying pan; others carry three pans graduated in size from eighteen to six inches wide so that as the gravel is concentrated they can shift to a smaller pan.

Half filling the pan with gravel and then filling it with water, the miner swirls it around with a circular motion, holding it at a slight tilt so that some of the water runs over the edge. This separates the materials, the heavier and finer grains moving to the bottom and to one side, while the larger and lighter grains accumulate on top and at the opposite side. These the miner throws away by working them over the side or scraping them off. He dips it constantly into the stream so that it is kept full of water. Soon nothing is left in the pan but a small quantity of heavy material, consisting mostly of black magnetic iron sand. If gold is present, the miner can often see it at once; or by rapping the bottom of the pan with a rock, causing the sand to bounce up and down, the heavy particles of gold are tossed into the air where they may be seen. A few drops of muriatic acid brighten the gold.



Top, a Makeshift Flume to Recover Gold from River Gravel; Right, a Homemade "Dry Wash" for Concentrating Pay Dirt

any gold that is there. Then the mercury is strained through the piece of chamois, leaving the flakes of gold on the surface.

Gold in the surface gravels usually means richer pay near the bedrock. The particles of heavy gold tend to sift to the bottom of the gravel. Sometimes the natural riffles and pockets on the uneven surface of the rock beneath the river actually collect handfuls of gold.

Heavy black sand is generally taken to mean that gold is present, but it is not a sure test. Banks of clean washed sand rarely contain gold. Colors and shades of red and blue in the sands of a gravel deposit are considered by miners to be a good sign that gold is there.

As placer gold is always washed down-

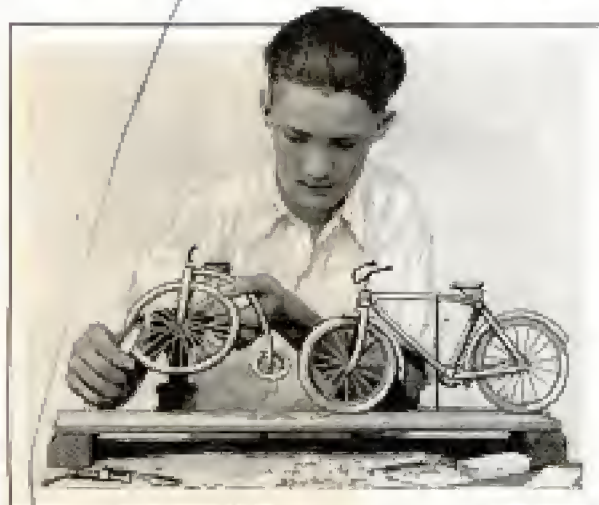
stream from a mother lode, the prospector slowly works his way up the stream until gold is no longer found in the gravel. Then he carefully combs the surrounding hills to discover the lode. Sometimes he finds "float" in the river bed—small chunks of ore containing gold. This is definite proof that somewhere upstream there exists a large body of gold ore.

Dry panning, similar to wet panning, is done when no water is available. The dirt must be crushed. Properly done, all the gold may be saved. If gold in paying quantities is found, a portable concentrating machine known as a dry washer is used. Dirt is dumped through a screen into a hopper which feeds the dirt out slowly on an incline across which baffleboards have been nailed. The incline is vibrated by turning a wheel, and the dirt slowly falls off the end. All of the heavy material, including any gold, is held by the riffles and is scooped off later.

The prospector does not confine himself to streams. "Gold in the grass roots" denotes easy riches and several mines have been discovered by pulling up tufts of grass. However, such gold is usually found on hilltops and more of it than farther down.

MODEL BIKES CARVED IN WOOD WITH JACKKNIFE *Q1031*

In the spare time of a few months, a fourteen-year-old California schoolboy carved two small but perfect bicycle models out of blocks of wood. His tools were only a sharp jackknife and fine sandpaper.



A Jackknife and Sandpaper Were the Only Tools Used in Carving These Bicycle Models

*Erville Crum
Redondo Calif*

*Designed by Carly
Q1074 Wernmark
1923 Colorado
Santa Monica Calif*



Automatic Shoe Soler That Fits and Attaches Soles to Uppers, Increasing Output of Workmen

AUTOMATIC SOLER FOR SHOES INCREASES OUTPUT

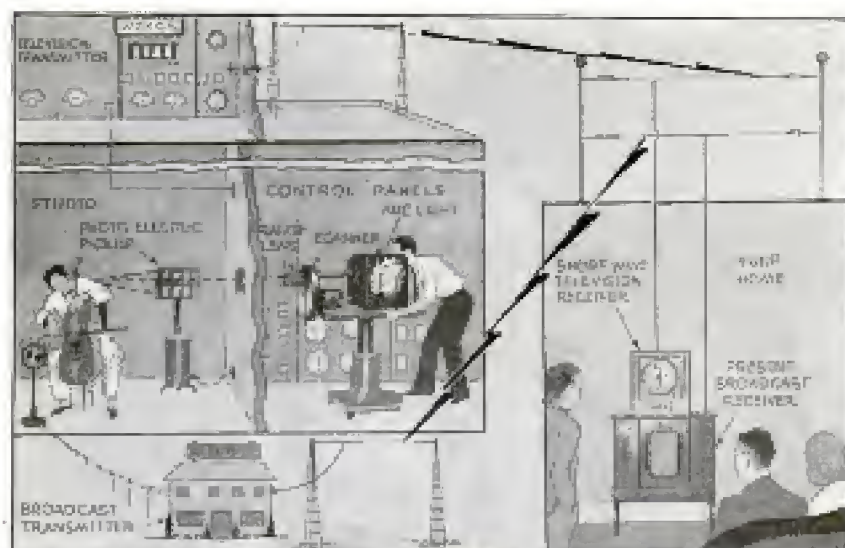
Tests with recently developed shoemaking equipment indicate that the present rate of shoe manufacture may be increased eighteen times. An automatic shoe soler fits and attaches soles to uppers at a speed far above that of other methods used at present.

HOW SAFETY-GLASS DISCOVERY RESULTED FROM ACCIDENT *Q1089*

Safety glass, the non-shattering material used in automobile windshields and the windows of bank cages and armored trucks, was discovered quite by chance in a laboratory accident. A French chemist knocked over a test tube that had not been used for months. He stooped to pick up the pieces and found that the paste substance in the tube held the shattered parts intact. He then recalled that the long unused tube had contained a mixture of trinitro-cellulose, ether, acetone and an acetate, and began a series of experiments which resulted in the production of the form of safety glass that is being used today.

*Lt. Houghberry Owen Jr.
42 Le Roy St. Dayton
Ohio*

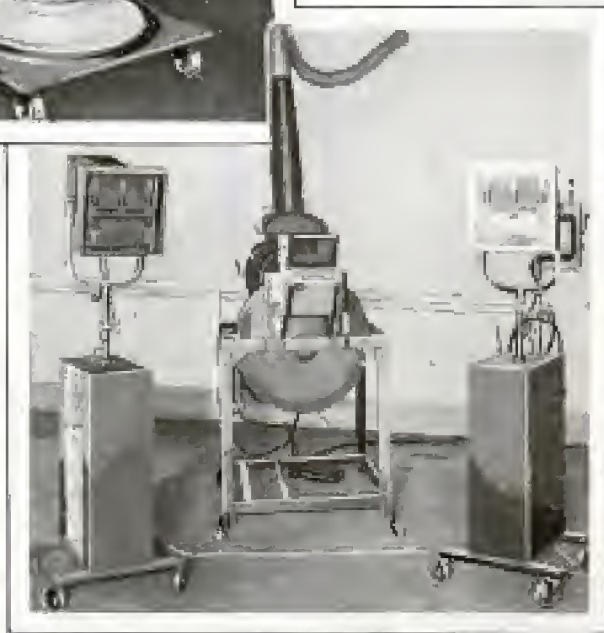
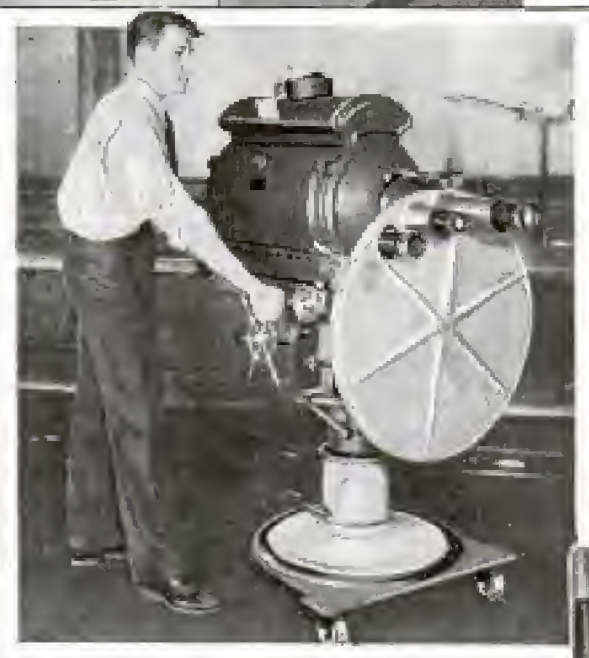
RADIO TALKIES UNITE SIGHT AND SOUND SIGNALS



voice, music or other desired sounds while the performers face the television scanner. In addition to the direct pick-up of living subjects, the studio is equipped for the transmission of motion-picture films. The film pick-up is like the usual projector. The diagram shows the method of transmitting and receiving the united sight and sound signals. The

Jenkins television station W2XCR and WGBS serve eastern listeners. Similar sight and sound programs are transmitted by WMAQ and its television station W9XAP, also WIBO and W9XAO, both using Western Television corporation apparatus. These stations serve sight and sound fans in

Radio artists and speakers may now be seen as well as heard by the radio audience in homes provided with a television receiver in addition to the usual broadcast receiver. Radio talkies, or combined sight and sound programs, are produced in a studio similar to the usual broadcasting studio with the exception that the artist faces a sweeping beam of light which completely scans the image to be transmitted. The Jenkins "flying spot" scanning device, shown in the center photo, is used to pick up living subjects. The reflected light from the image is picked up by the battery of photo-electric cells, shown below, which translate the varying intensity of light into corresponding electrical fluctuations. Amplified millions of times, the electrical impulses are impressed on the television transmitter which broadcasts corresponding signals. With a powerful arc light, lenses and adjustable mirrors, the operator can direct the scanning beam to pick up a close-up, a half length or a full length of the performers. The nearby microphone in the studio picks up the



the middle west and the programs are listed in the daily newspapers.

Improving Your Old Set

by F. E. Baker

Part Two

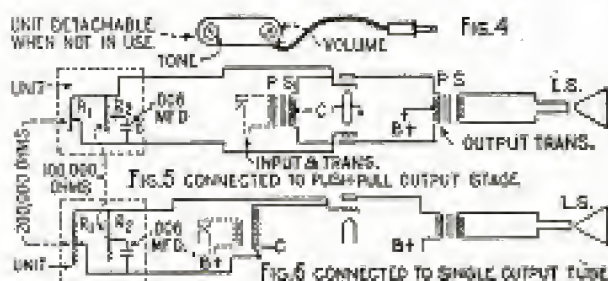


THE type-45 power-tube adapter shown on page 121 of the July issue is inexpensive and easy to build. It will enable owners of sets having low-power amplifiers to operate a louder speaker with better output quality without making any changes whatever in the set itself. The type-45 tubes may be used either singly or in push-pull, according to the design of the original amplifier in the receiver.

The core cross section, for the filament transformer, is $\frac{3}{8}$ in. square and may be obtained with a core $\frac{1}{2}$ by $\frac{3}{4}$ in., or if the laminations taken from an old audio transformer happen to be $\frac{5}{8}$ in. wide, they may be piled to a height of $\frac{5}{8}$ in. The form for winding the coil is shown in Fig. 2 in Part I. This is made of wood and the bobbin will have a cross section $\frac{7}{16}$ in. larger than that of the core to permit the insertion of the latter after the bobbin is removed. A $\frac{1}{4}$ -in. hole is drilled lengthwise through this form. The ends are of $\frac{1}{4}$ -in. wood and large enough to retain the wire. Lengths of friction tape are placed on the form, as indicated by the dotted lines, to hold the coil in shape when the bobbin is removed. A length of threaded $\frac{1}{4}$ -in. brass rod is thrust through the form and the ends clamped to the bobbin at each end by means of nuts. This holds the form rigid, and one end of the rod may be placed in a hand

the bobbin at one end for the starting end of the primary winding, which consists of 1,320 turns of No. 30 enameled wire. Wind in layers as evenly as possible and cover each 300 turns with a layer of wrapping paper. After this coil is completed, cover it with three layers of friction tape.

The filament winding for two type-45 tubes must supply 3 amp.; therefore it will be necessary to use heavy wire. As



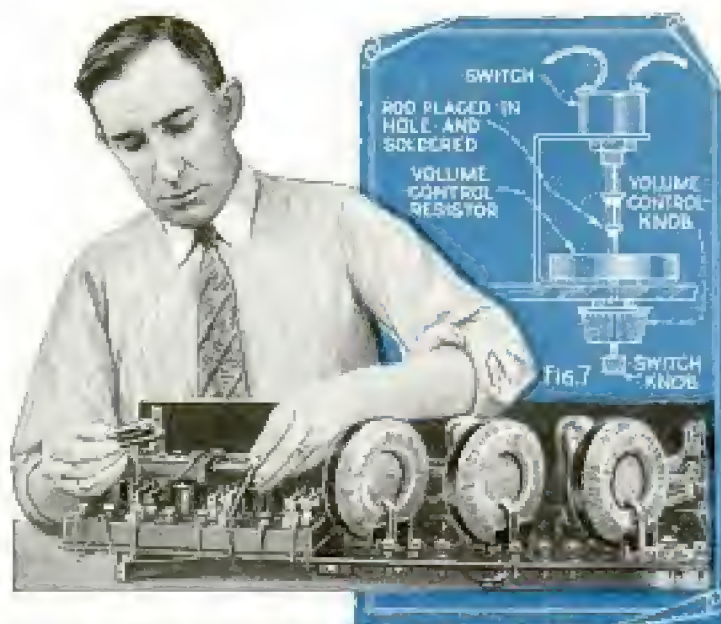
the size required is not easily obtained, the writer used two smaller wires wound in parallel, as indicated in the schematic diagram. Two 16-ft. lengths of No. 18 bell wire are used to make 30 turns over the primary. This winding is then covered with a layer of tape.

The coil is now removed from the form and the laminations inserted snugly to prevent vibration.

The container, detailed in Fig. 1, of Part I, may be made of thin brass or sheet tin if this is on hand. Fig. 3 shows the assembly of the unit on the wood base. The original audio tubes, removed from the set, are replaced by the plugs. The type-45 tubes are inserted in the sockets of the adapter, and the unit is ready for testing. If but one amplifier tube is used, the only change required is in the biasing resistor A, which must be altered from 700 to 1,400 ohms. The plate and grid connections, indicated as 1, 2, 3 and 4, in Part I, are soldered to flexible rubber-covered leads and also to the plate and grid prongs of the plugs. The



drill and clamped in a vise to act as a coil winder. A hole is drilled through



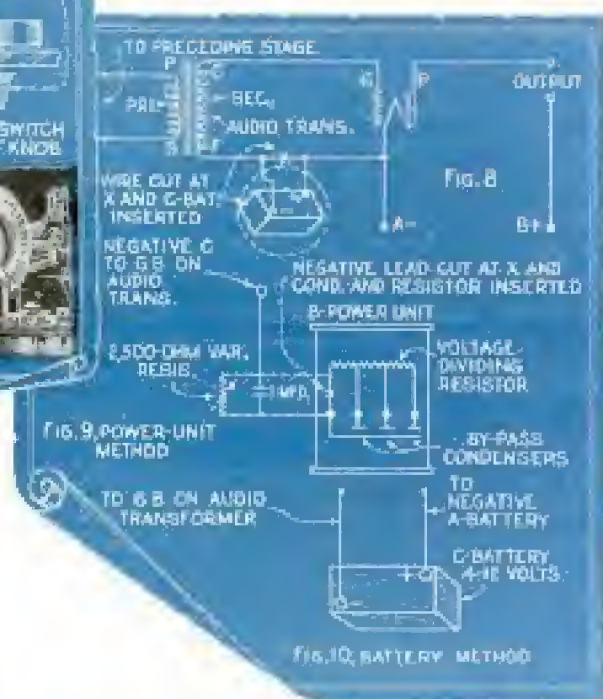
return lead from the end of the biasing resistance is connected to the negative-B on the receiver.

A handy improvement for the old set is shown in the photo at the head of this article. It consists of an extension tone-and-volume control unit that anyone can make for himself. It is merely plugged into an open-circuit jack, mounted at any convenient point on the front panel. The unit consists of the two variable resistances R_1 and R_2 , mounted in a box of suitable size, the leads being of any length desired and terminating in an ordinary phone plug, as shown in Fig. 4. The unit is indicated within the dotted lines in Figs. 5 and 6. The connections to the jack are made to the grids of the push-pull tubes and, in the case of a single output tube, to the grid of the audio tube, the other end being taken to the opposite end of the transformer or to the bias lead. In most cases it may be connected directly to the filament lead at the socket. If hum occurs with this connection, it will be necessary to connect at the bias lead as indicated in Fig. 6.

The lower photo on page 295 shows a common method of improving old tuned r. f. receivers by substituting solenoid coils of modern design for obsolete or damaged coils. Such coils should, of course, match the capacity of the variable condensers used in the set.

For receivers employing resistance-coupled amplifier units using obsolete tubes that require no filament regulation a suitable amperite or ballast may be in-

serted in the negative-A lead to such units as shown in the photo on this page. This will enable the owner to use standard tubes without making any other changes in the circuit.



A simple method of combining a filament switch with a volume control is shown in Fig. 7, which is self-explanatory.

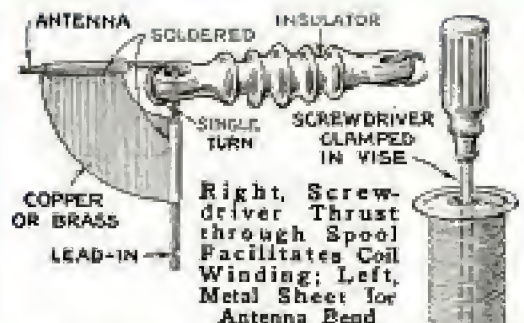
Many battery sets do not use C-batteries for grid bias on the a. f. transformers. Without such a bias even the best transformers would give poor results. Figs. 8, 9 and 10 show several simple methods of adapting such receivers for grid bias. The mark "GB" indicates grid bias, and these leads are taken to the negative-F post on the ordinary audio transformer.

Checking Grid Voltage

A high-resistance voltmeter is necessary for checking the grid voltage. The negative terminal of the meter is connected to the grid terminal of the tube, and the positive is then connected to the filament post or, on a c. sets, to the chassis of the receiving set.

For further information on any radio construction article write to the radio department; this service is free.

SIMPLIFIED ANSWERS TO YOUR RADIO PROBLEMS



Right, Screwdriver Thrust through Spool Facilitates Coil Winding; Left, Metal Sheet for Antenna Bend

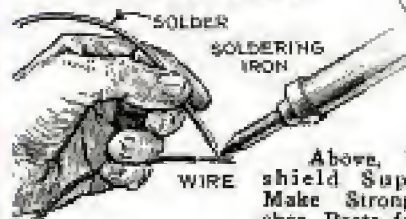


Left, Aluminum Cup Makes Good Protecting Case for Test Meter



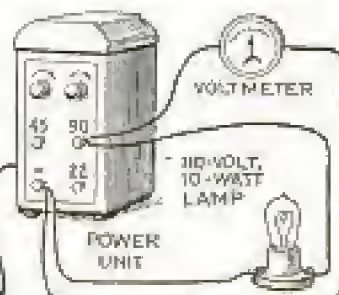
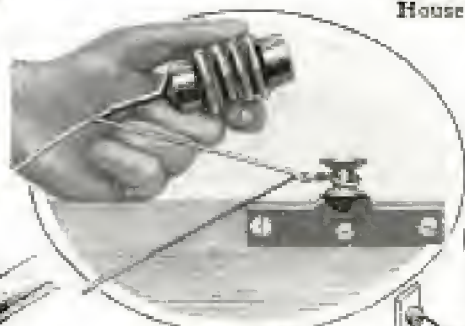
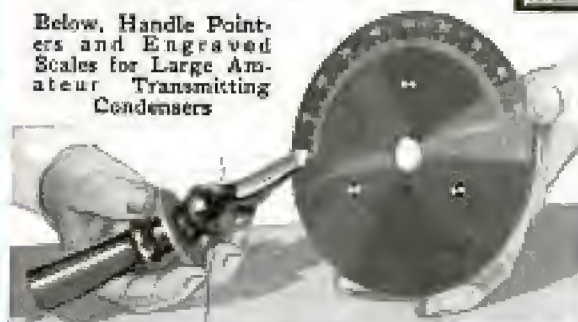
Lightweight Angle Iron Used for Assembling Small Transmitter Frames May Also Be Employed for Constructing Shielded Metal Cabinets to House Homemade Radio Receivers

Wire-Wound Resistors, Used as Multipliers for Extending the Range of Meters, May Be Inserted in Gridleak Mounts

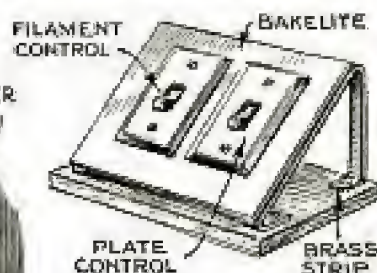


Above, Windshield Supports Make Strong Anchor Posts for Antenna Guy Wires; Left, Above, a Flexible Lead May Be Tinned as Shown; Below, Brass Strips Clamped on Resistors Relieve Strain on Wires

Below, Handle Pointers and Engraved Scales for Large Amateur Transmitting Condensers



Lamp Used as an Artificial Load for Testing B-Power Units under Working Conditions; Below, Wall Plates Adapted for Switch Panel; Left, Phone-Tip Jack Arrangement

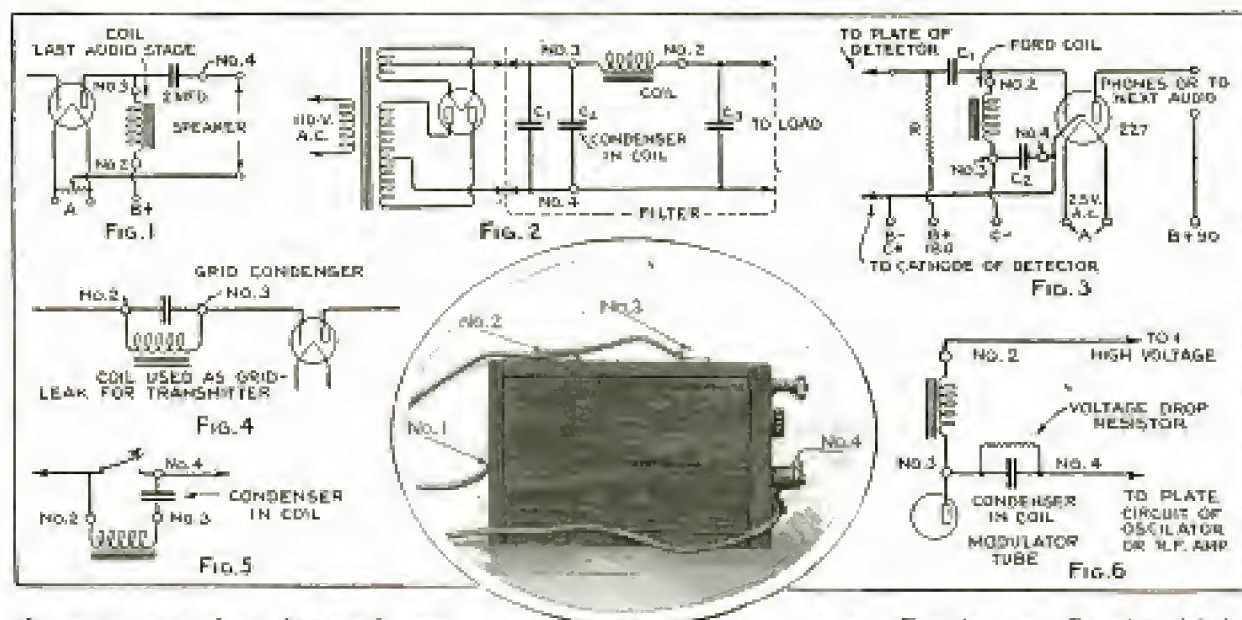


Left, a Brass Drawer Pull Makes a Handy Reflector for a Small Dial Light and Is Easily Mounted by Means of Two Small Machine Screws as Shown

Old Ford Coils Useful in Receivers and Transmitters

Nearly every radio enthusiast's junk box contains at least a few old Ford coils; these have many uses in radio circuits, quite a different application from their original use. The various diagrams

other coil in parallel with the first, as the d. c. resistance of a single coil is pretty high. To do this, solder connection No. 2 of the second coil to No. 2 of the first, No. 3 to No. 3, and No. 4 to No. 4, and the job is completed. In Fig. 2 the coil is employed as a filter choke in a B-eliminator and C_2 is one of the filter condens-



show some that have been proved practical by the writer, and which may be useful to many others. In this type of coil there is a secondary of some 30 henries and a condenser across the vibrator contacts of 2-mfd. capacity which will stand up under about 400 volts continuous direct current. The photo shows a coil of this type with four numbered connections soldered to it. These connections are similarly numbered in the various diagrams showing uses of the coils. It is not necessary to dismantle the coil; just solder on the leads as they are shown in the photo and connect as in the diagrams. There are two kinds of these coils, an old type having a metal top and one with a wooden top. Wire No. 4 is connected to the lower vibrator if the coil has a metal top, and to the upper vibrator if the coil is of the latter variety. A piece of fiber or other insulating material must be placed between the vibrator contacts, or they may be removed entirely if desired. Fig. 1 shows the coil used as a method of coupling the loud speaker to the audio amplifier. The tube may be any type such as the 171-A or 245. If you have more than one coil, it is a good idea to connect an-

ers. Condenser C_1 should be about 4 mfd. and rated to stand at least 1,000 volts, and C_2 should be of the same capacity and rating. In order to keep the voltage drop in the coil low, it is advisable to use several of the coils as chokes connected in parallel. Fig. 3 shows the coil used in an impedance-coupled stage of audio amplification employing a type-227 tube. Condenser C_1 should be .01 mfd., and R should be a resistor of 250,000 ohms. C_2 is the condenser in the coil. The writer used the hook-up in Fig. 4 to provide a gridleak for a low-power transmitter, and in Fig. 5 it is shown as an effective key thump filter in the same transmitter circuit. Fig. 6 shows the method of using the coil as a modulation choke, and in this case it is best to use several of the coils in parallel to keep the voltage drop in the coils at a low value. The coils may be used with tubes as large as type-210, providing several coils are used in parallel.—Robert I. Crowell, Dennis, Mass.

❑The thick end boards from packing boxes, sanded and shellacked, make excellent baseboards for the construction of experimental apparatus.

Recording Your Own Records At Home

by H. McKay — Part 2



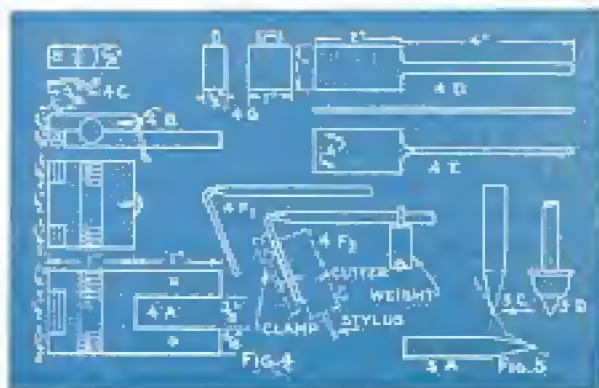
THE LAST unit to complete the tracking device described in Part I of this article in the July issue, is the threaded clamp shown in Fig. 4. It is fastened to the cutter and is made of two pieces of brass, $\frac{3}{16}$ in. thick, one piece 1 in. square and the other 1 by 2 in., which are joined at one end by means of a stout hinge. If a milling machine is available, it will be found convenient to shape the pieces as shown in Fig. 4, so that they may be pinned together, the hinge being part of the block itself. Two holes are drilled, as shown at 4A, in the legs of the longer pieces. The exact location of these holes will depend on that of the mounting holes in the phonograph pick-up which is used as a cutter. A No. 4 hole is drilled and tapped in the middle of the end of the shorter piece, as shown at B, Fig. 4. A piece of spring steel is then bent as shown at 4C and screwed to the end of the shorter arm as indicated at 4B. This spring slips between the legs of the larger piece and serves to hold the two pieces together as indicated.

A plate of brass, $\frac{3}{8}$ in. thick and shaped



Adjusting the Control Panel for Best Tone and Volume before Recording

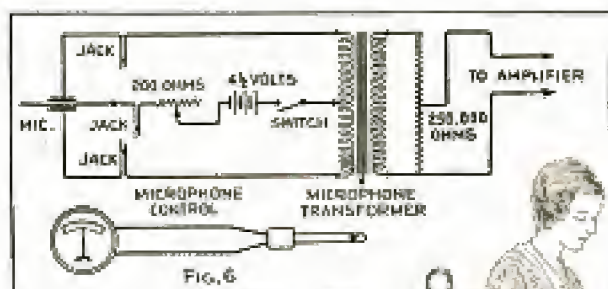
as shown at 4D, is then made. The narrow arm is twisted as shown at 4E and bent down as indicated at 4F₁. The two holes A, shown on 4E, are drilled to correspond with the two holes A in the split nut. This nut is now screwed to the pick-up with the piece 4D clamped between these two pieces as shown at 4F₂. The 4-in. arm of the piece 4D projects forward



and serves to carry a weight which may be regulated as desired. The weight, shown at 4G, is used to adjust the pressure of the needle upon the record and is provided with a wire bail, set in the top as shown. The needle is prepared by grinding an ordinary loud-tone needle as shown in Fig. 5A. The ground surface will appear as a pointed oval, the rounded side of the needle doing the cutting as the record moves against it, as shown at 5C. Some phonograph stores sell sapphire needles, shaped somewhat as shown at 5D, which will prove very good cutters for this work.

This completes the tracking device which serves to guide the cutting stylus across the face of the record.

Any phonograph may be used for re-



cording, provided it has the strength to pull against the friction of the cutting point. The electric motor is preferred because it is more uniform in action than the spring-driven types. A suggested improvement for the phonograph is to remove the turntable and pour about 2 lb. of melted lead in the underside. This added weight will tend to steady its motion, but the lead must be evenly distributed to preserve accurate balance.

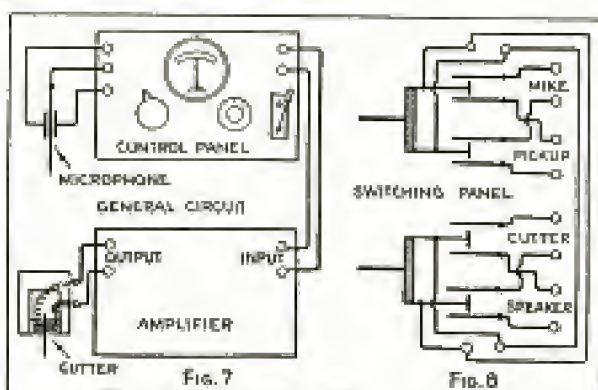
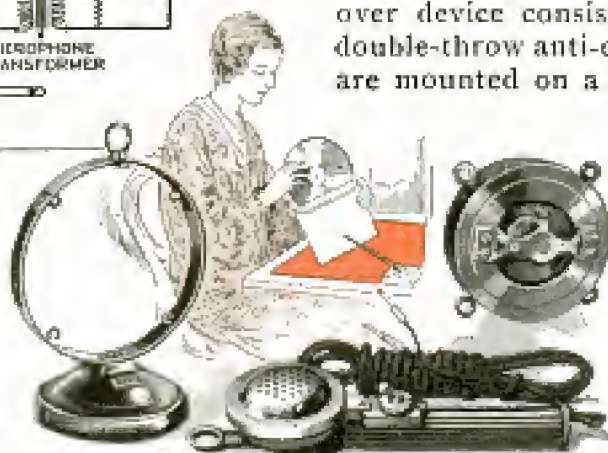
The cutting head may be any good phonograph pick-up, but the reproduction of course depends on the quality of this device. The microphone may be one of the inexpensive popular single-button hand types or the improved two-button carbon model that sells for about \$25. Both types are shown in the central picture on this page. If the two-button type is used, it will be necessary to arrange a control panel, the diagram for which is given in Fig. 6. The control panel supplies the current for the microphone, a control meter and a volume control. The meter may be an external plug-in type, as shown.

A good amplifier for home recording is either the Loftin-White circuit or one of the conventional phonograph amplifiers using two type-45 tubes in push-pull for the output. Many receivers having excellent amplifier stages may, of course, be used for this purpose especially if a pre-amplifier is used. A pre-amplifier of this kind will be described in the September issue.

With the entire equipment connected as shown in Fig. 7, you are ready to start testing. Aluminum record blanks, about 6 in. in diameter, are available for home recording and make a suitable size for in-

closing in an envelope as a "vocal letter" to a distant friend or relative.

The layout for the switching panel is shown in Fig. 8. This convenient change-over device consists of two double-pole double-throw anti-capacity switches which are mounted on a bakelite panel and installed at any convenient location between the control panel and amplifier. The output of the control panel is connected to the binding posts marked "mike" in Fig. 8; the leads



from the pick-up to the switch terminals indicated, and the leads to the cutting head and speaker to the posts indicated on the lower switch. The wiring of the switchboard is now completed by the two sets of binding posts, which are connected to the center poles of the two switches, as shown in Fig. 8.

The switchboard enables the operator to connect the electric phonograph pick-up, or radio-detector output, to the cutting head for duplicating, or to the loud speaker for playing records in the ordinary manner; to connect the microphone to the loud speaker for testing purposes, and to the cutting head for direct recording. All the instruments may be kept set up and the change-over made by merely throwing the switches.

When preparing to make a record, adjust the microphone-control unit for best tone and volume by connecting the microphone to the loud-speaker terminals and substituting a headset for the speaker, as shown in the photo on page 299. The

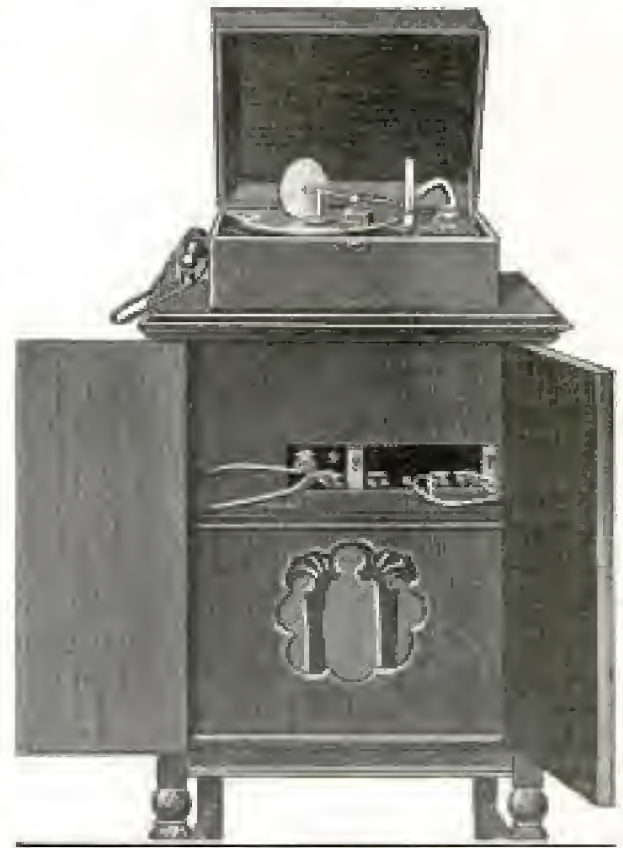
*Universal Microphone Co.
Glendale, Calif.*

rheostat should be adjusted to show a current of about 10 milliamp. for each button when recording. After the control unit is adjusted, replace the connections and throw the switch to the recording position. Holding the cutting needle against the finger, and speaking sharply into the microphone, the operator should feel the response of the needle to the voice.

The split nut fastened to the sound box is now opened and the sound box adjusted on the threaded shaft, so that the needle is near the outer edge of the record. The phonograph may now be started and the operator should speak distinctly and directly into the microphone. With some microphones, especially the two-button type, it is better to speak across the microphone from a distance of about 6 in. When the test record has been completed, it may be played back immediately, as shown in the photo at the head of the article. Fiber or so-called "cactus" needles should be used for this purpose. A steel needle will scratch the surface of the record and will not give satisfactory reproduction.

The microphone should work efficiently with the 250,000-ohm volume-control potentiometer about halfway between minimum and maximum. If this is the case, it will be possible to record instruments up to 6 ft. away by increasing the volume control. If an amplifier of the Loftin-White type is used, the "hum-bucker" will have to be adjusted critically on high-volume work. The 0-to-25 milliammeter should be connected to a suitable length of cord so that it may be plugged into either of the jacks in series with the buttons for frequent checks, to be sure that the current on each button does not exceed 12 milliamp. The center jack, connected in series with the 200-ohm variable resistor and the diaphragm of the microphone, is used to read the total current for both buttons, and this is the reading to be watched while recording.

After the recorder has been completed, a number of further tests will be necessary to put it into proper final adjustment. Maximum results will depend on the care with which these tests are made. The tests include the current and pressure applied to the microphone, the angle at



Combined Amplifier and Switch Panel Installed in Console with Loud Speaker; Above, Portable Electric Phonograph with Record Cutter

which the needle rests upon the record, the weight which is applied to the cutting needle and the preparation of the record for cutting, unless a commercial record blank is used. Homemade blanks may be made of aluminum, copper, pewter or zinc; copper is very satisfactory when the pure sheet metal can be obtained, but the ordinary commercial sheet copper is not uniform enough for the purpose. Zinc takes the recording well, but gives off considerable ground noise; pewter gives excellent results but is more expensive. Aluminum sheet, about $\frac{1}{2}$ in. thick, will give the best results at a moderate price, and should be perfectly flat and free from scratches.

Before using the blank, a few small pieces of paraffin should be melted on its surface, just enough heat being applied to melt the wax without causing the metal to warp. While the wax is still hot, turn the disk on edge to allow the surplus wax to drain off, then let it cool. This waxing is necessary, regardless of the material used, as it aids in recording and reduces the ground noise. Completed blanks should be kept in waxed-paper envelopes.



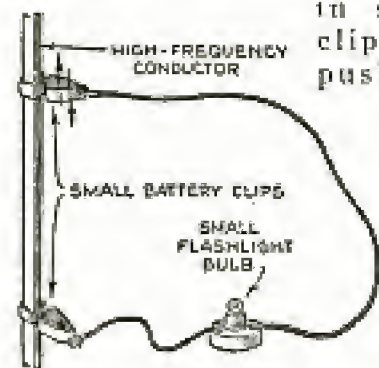
Sectional View Shows Method of Suspension and Location of Tuning and Volume Controls

Installing Radio in a Coupe

A handy place for the set is behind the seat where it is out of sight, yet instantly available for adjustment and tube renewal, by raising the rear deck. The receiver is suspended by means of airplane shock-absorber cord, and the flexible leads to the controls are run up to the deck in the manner shown. The necessary batteries may be installed under the seat or suspended below the car in a battery box. The speaker can be mounted on brackets in the position shown or behind the instrument board, as preferred.

Current Indicator for Amateur Transmitter

The relative amount of current in the antenna or tank circuits may be estimated by means of a flashlight bulb connected to two short flexible wires terminating in small battery clips. One clip is pushed along the high-frequency conductor with a wooden stick until the lamp lights. The closer the clips can be brought to each other and still light the bulb, the more current there is in the conductor.



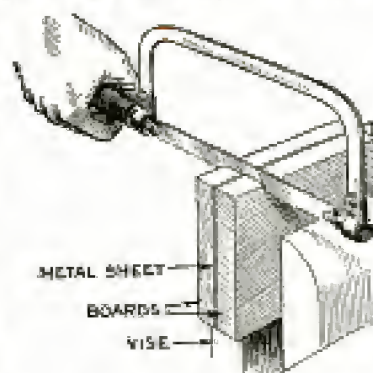
Resistance wire for a variety of uses may be had from discarded household appliances.

Quality Improved by Detuning

The band-pass system of r. f. amplification, which will not cut side bands or cause distortion, may be tried by any owner of a two or three-dial receiver. The results will only approximate those obtained with this system, but a distinct improvement will be noticed. For example, if all three circuits of a receiver are tuned to exactly the same frequency, the amplification of that frequency will be great but the side bands, or high audio frequencies, probably will be cut off. If one of these tuned circuits is left alone, the second raised a degree or two, and the third lowered the same amount, an improvement in quality will be obtained. This detuning will result in a little less amplification, but is well worth while.

Wood Clamps Aid in Working Sheet Metal

Lightweight sheet metal, such as is used in making stage shields, may be easily drilled, filed or cut if clamped between two boards as shown. By this method the sheet metal is held rigid, so that holes will be without burrs, and clean straight cuts can be made. — Ross J. Plaisted, Brecksville, Ohio.



Overloading Shortens Tube Life

Overloading of transmitting tubes results in inefficient operation and greatly shortens the life of the tubes. When used as an r. f. amplifier, the plate should not be allowed to heat to a cherry-red. The cause is too high plate voltage and plate current, inefficient transfer of energy between this tube and the succeeding stage of amplification or to the antenna. If the input voltage and plate current are normal, the cause is the last-mentioned, and the condition may be corrected by retuning succeeding stages and the antenna circuit.



A Real Electric Motor for a Cent

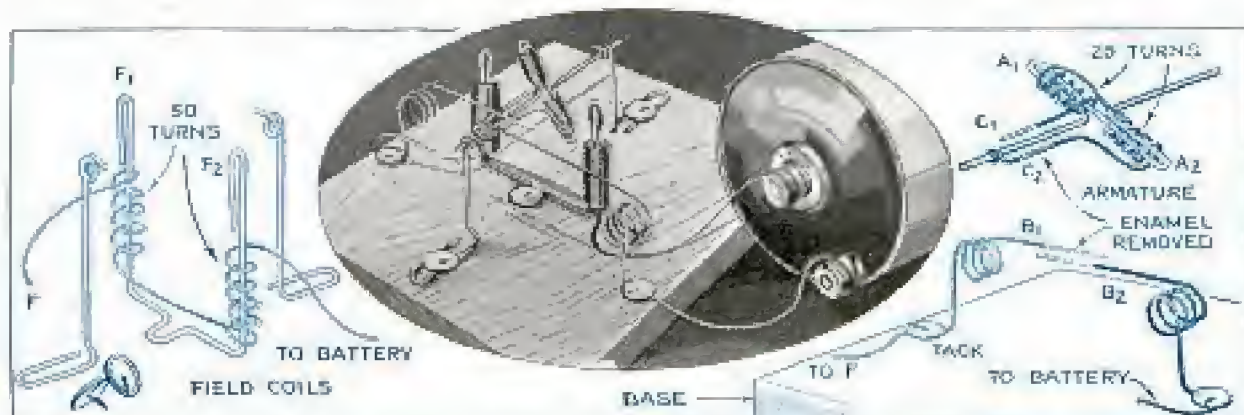
by **DOMINICK LABINO**

MADE from ordinary wire paper clips and No. 26 enameled wire, this small electric motor takes only a few minutes to construct. It is a series motor and will run either on a. c. or d. c. at a low potential, such as that provided by a single dry cell.

The framework for the field coils and the armature are first made from paper clips bent to the shape indicated, and the armature supports are then made in a similar way. Wind 50 turns of enameled wire on F_1 and F_2 , the direction of winding on these poles being opposite and both coils being connected together. The free end of one coil is connected to the battery while the end of the other coil, marked F , connects to one of the armature brushes B_1 , shown in the lower right detail. The armature is wound next, 25 turns of wire being wrapped on poles A_1 and A_2 , both coils being wound in the same direction and terminating at C_1 and C_2 , where the enamel is removed from the wire, leaving the bright copper surface which forms the commutator. The brushes B_1 and B_2 are simply lengths of enameled wire with the ends brightened

to form good electrical contact and wound in a spiral form, as indicated, to produce a spring effect which causes the ends to make good contact with the commutator. The field-coil frame, the armature supports and the brushes are then fastened to a wooden base with thumbtacks, and the armature is slipped in position. Carefully adjust the brushes so that they will touch the commutator lightly, the proper tension at this point being highly important. Now hook up B_2 to the other terminal of the battery and the motor will run if it has been correctly wired and properly adjusted.

The operation of the motor can be greatly improved by having the coils on the armature balanced as closely as possible and spaced exactly the same distance from the center. This point should also be taken into consideration when forming the armature frame. The small eyes at the end of the armature supports, which serve as bearings, should make a loose fit on the armature shaft, and light machine oil may be used here to reduce friction. Drops of solder at the ends prevent the shaft from slipping out.



The Framework of This Small Motor Is Made from Paper Clips, While Enameled Copper Wire, Wound on the Poles of the Field Coils and Armature, Is Also Used for the Brushes and Commutator

PHOTO FLASHES SYNCHRONIZED WITH EXPOSURE



Two or More Photo Lamps Can Be Flashed at the Same Time the Graflex Shutter Is Operated with Switch near Releasing Mechanism.

Synchronizing the flash of one or more photo lamps with the action of your Graflex is made comparatively easy by providing a switch on the camera to close at the same time the shutter is opened. A switch of this kind is shown in the circular insert of the illustration. After the photo lamps have been placed where

needed for correct illumination, the extension cords are brought to the source of current supply. One of them is cut, and the two ends thus formed are connected to a similar cord, long enough to reach to the camera, where the two free ends are hooked to the switch. You can readily see how the switch is arranged, one end of the cord being attached to the shutter-release plate to make a good electrical contact, while the other is attached to a small binding post carrying a spring, with which the lever on this plate makes contact, thereby closing the circuit and flashing the lamps. In use, the mirror lever is pulled down, the shutter curtain is set at zero and the tension at No. 3 or less. Pressure on the shutter release raises the mirror at exactly the same time that the current flashes the lamps, which is just before the curtain drops.

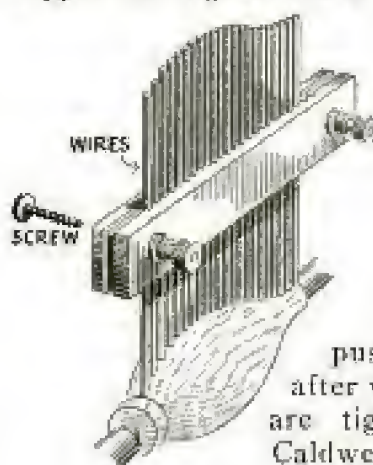
Sharp Sand Protects Young Plants from Slugs

Young plants can be protected from slugs by using sharp sand. First remove all the slugs from the ground about the plants and then spread a 1-in. layer of sharp sand around each. Finely crushed rock or powdered lime can also be used, but the latter should be replaced often.

Contour Gauge for Duplicating Design of Turned Work

Consisting of two strips of wood, clamped over a number of nails or lengths of wire, the illustrated gauge is handy for determining the contour of turned work when the design is duplicated. A number of notches cut in one side of each clamp and spaced about $\frac{3}{8}$ in. apart, serve to

hold the nails parallel to each other. Two stove bolts fitted with thumbnuts are slipped through holes at the ends of the



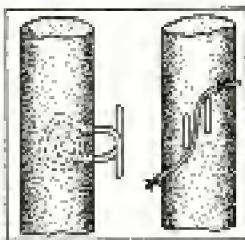
clamps to hold the assembly together. In use, the clamp is placed parallel to the center line of the work and the nails are pushed against it, after which the screws are tightened.—F. W. Caldwell, Nebo, Ill.

■ A set of two blueprints, SN-7 and SN-8, on "Aero-Boat" can be obtained for 50 cents and a material list will be sent free.

How to Eradicate Moths

Moths in carpets can be eradicated by taking up the carpet and cleaning it. If signs of moths are discovered in the cracks of the floor under the carpet, wash it with benzine and sprinkle red pepper over it before putting the carpet down. If heavy carpets are suspected of harboring moths, fold the edges back, and wash the floor with strong soapsuds in which a tablespoonful of borax has been dissolved. After the floor has dried, tobacco leaves, laid along the edges of the carpet, will help keep moths out. Another method is to mix a tablespoonful of turpentine to each quart of water used, going over the carpet with a sponge dipped in this solution, and squeezing until nearly dry, the carpet having been thoroughly swept first. Change the water as often as it gets dirty. In this way the carpet will be well cleaned as well as disinfected, and all moths and eggs will be destroyed. A good way to brighten up a carpet is to put a hair tumbler of spirits of turpentine in a basin of water, into which the broom is dipped and swept over the carpet two or three times. Spots can usually be removed by using ox gall or ammonia and water.

Fence Posts Fitted with These Clips Are Easily Wired



Galvanized-wire clips imbedded in concrete fence posts as shown need not be bent when putting on or removing barbed-wire. The ends of the clips should project

beyond the surface and are bent at right angles in opposite directions, with sufficient space between them to allow the wire to be inserted.

Detecting Counterfeit Coins

Counterfeit coins can be detected by using a solution consisting of silver nitrate, 24 gr., nitric acid, 15 drops, and distilled water, 1 fluid oz. Thoroughly mix the solution and apply to the coin with a glass rod. If any other metal is present in larger quantities than in the standard U. S. alloy, a black stain appears.



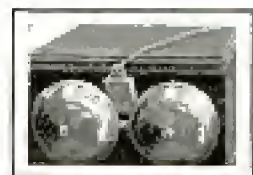
When Your Arms Are Full of Bundles a Foot-Operated Latch Is Handy

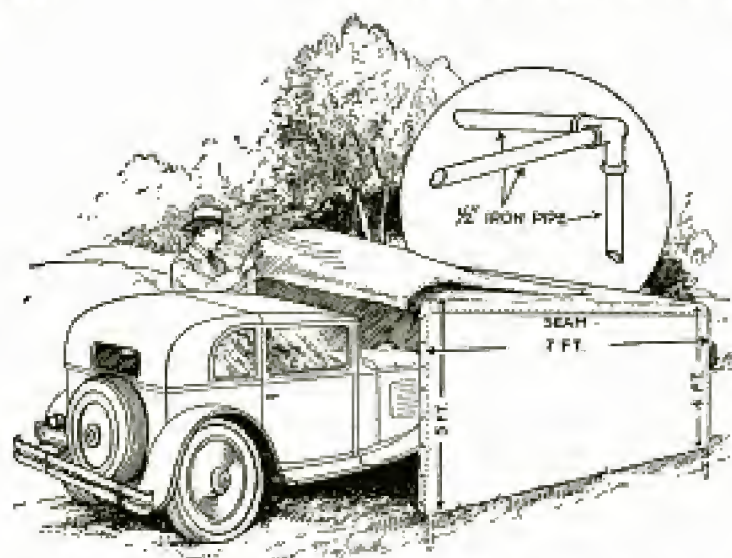
Foot-Operated Latch Opens Gate

When you have to pass through the back-yard gate with arms full of packages, a foot-operated latch will be appreciated. It consists of two pivoted members, one engaging the latch and the other attached to the lower rail of the fence, both being connected with an iron-rod link, as shown in the upper detail. The lower pivoted member has a tread nailed to the underside at one end, while the other end should project far enough from the pivot to form a counterweight which keeps the latch closed. The tread is extended so that it can be reached from both sides of the fence. To keep the gate closed, a coil spring or a counterweight can be used as shown.

Telephone Bell Is Muffled with Rubber Wedge

When it is desired to muffle the telephone bell, a small wedge-shaped piece of rubber will be found effective. Slip the wedge between the bells and the box so that it will not touch the clapper. In case of illness, or when privacy is desired for other reasons, this idea will be found especially useful.





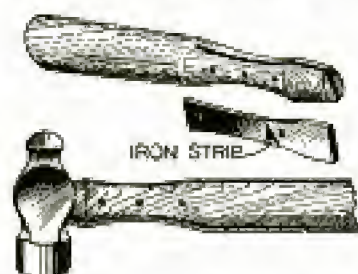
This Small Canvas Garage to House Your Midget Car Has the Advantage of Portability

Midget Car Kept in Canvas Garage

Owners of midget cars who find the average garage too spacious for their needs, will find this canvas garage, which can be rolled up and taken along from place to place, highly convenient. The framework consists of pipe and fittings as shown in the detail, the uprights being pointed at the lower end so that they can be driven into the ground to obtain the necessary rigidity. The door is merely a flap sewed to the front edge of the roof and is thrown back when the car is driven in or out. Snap buttons or hookless fasteners can be used to close it. The edges of the roof should overlap the sides so that the rain cannot leak in.

Iron Strip Strengthens Tool Handles

Tool handles that are subjected to considerable strain can be reinforced by the use of an iron strip in the following way:



Saw a slot in the end of the handle lengthwise as shown in the illustration, after which a piece of flat iron, fitting the slot, is cut to the shape of the handle, and inserted into the slot. Three holes are drilled through both the handle and the iron core for rivets, the ends of which are smoothed down with a file.

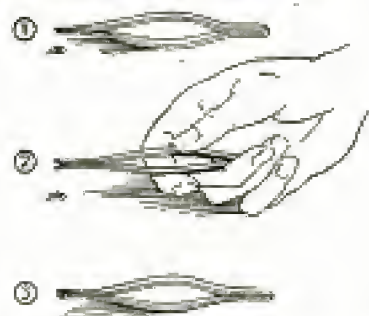
Good Undercoating for Paint

So many different kinds of wood are being used nowadays in the construction of homes that it is often rather difficult to get any degree of uniformity. The different grades vary in density, which accounts for the fact that one piece will absorb much more paint than another. This has been found to be especially true in the case of siding. It is, therefore, hard to get a good foundation or undercoating for finishing coats of paint. By using a mixture of red and white lead in equal parts, thinned down to the proper consistency with boiled

linseed oil, the trouble can be overcome. In some cases where finishing coats are not satisfactory, it will be found advantageous to remove the paint entirely with a torch or with paint remover, and then build up a new surface, using the red and white-lead mixture. When dry, any good grade of house paint can be applied.

A Self-Gripping Pair of Tweezers

For those who handle small screws and parts, these self-gripping tweezers will be found convenient. A



length of spring steel or brass is bent to the shape shown. By pressing the tweezers, the points are opened and will automatically close when the pressure is released.

Reinforcing Celluloid Toys

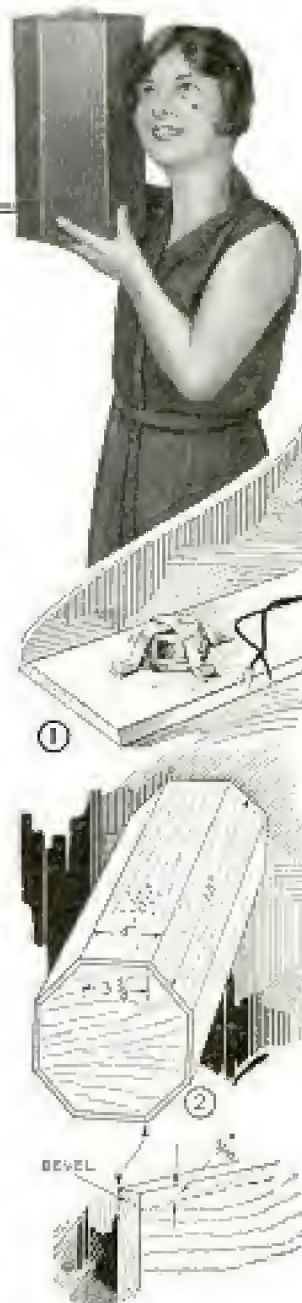
Hollow celluloid novelties used by children for playthings can be reinforced so they will last indefinitely. Make a small hole in the toy at an inconspicuous place and fill the inside with paraffin or plaster of paris. The former has the advantage that it can be removed by melting if desired, which should in this case be done by immersing the celluloid toy in hot water to avoid any danger from fire.

THIS WHISPERING BOX WILL MYSTIFY YOUR FRIENDS

SUPPORTED on a table or carried about the room without any wires or other connections, this whispering box, which mysteriously answers all questions, makes a hit at any party, and the time spent in making it is well repaid by the enjoyment derived from its use.

The operator, hidden in the basement, attic or some other room, where his voice will not be directly audible to the guests, hears their questions distinctly through a radio, telephone or dictaphone receiver, wired up with two dry cells and a small dictaphone transmitter concealed in the guest room. He speaks into a similar transmitter, which is connected with a battery of dry cells and to a larger coil of wire under the rug of the room where the whispering box is located. The resulting fluctuations of electric current passing through the rug coil produce a magnetic field of varying intensity, which sets up corresponding electrical impulses in a small coil inside of the whispering box, and these are passed through a receiver, also in the box, where they are transformed into audible sounds. This process of induction is illustrated in Fig. 5, while the complete wiring diagram is shown in Fig. 8.

The whispering box is octagon in shape. Cut the sides from $\frac{3}{8}$ -in. stock to the dimensions given in Fig. 2, and bevel the edges so that they will fit together snugly when assembled on the octagon-shaped ends. A portion of one side is perforated with a number of small holes, arranged in symmetrical order so that the sound produced by the receiver, which is located directly underneath, will not be muffled. The receiver is held in place by means of two rubber bands tacked on the inside, as shown in Fig. 1, and its two terminals are connected with a coil of wire shown in Fig. 3. This coil consists of 400 turns of No. 24 enameled or d.c.c. magnet wire, and its outside diameter should not



answering any questions that the guests may choose to ask. Of course, you need not confine yourself to a whispering box for such entertainment. By adhering to the basic principles involved, you can use a talking vase, a whispering Buddha, the voice of a lost mariner (in a ship model), a talking teakettle, etc. A different mode of construction along the line of an octagon or hexagon box would be to use two boxes, one within the other with the wiring between them, but the center space open for inspection to show the guests that everything is above board.

Rubber Tips for Chairs

Windsor chairs, and others generally used on tile or highly polished floors, often slip and their fragile construction may be responsible for accidents. The slipping can be prevented by fitting rubber crutch tips over the leg ends. The tips may be painted in the same colors as the chairs.

Quick Method of Chalking Line

For quickly chalking a line, a tin can having two narrow sheet-metal guides



soldered across the bottom and a row of holes punched between the guides, will be found convenient. The guides are spaced just far enough apart to allow the chalkline

to be slipped through, and the exposed edges are bent over slightly. The can is then filled with talcum powder or whiting, after which the line is slipped through.

Mousetrap Used for Bill File

A holder for bills and other papers around the home or shop, can be made from an ordinary spring mousetrap. The trigger is removed and the trap is screwed to the wall or cabinet. The bills are slipped under the spring, and if desired, the trap can be painted to match the trim.



Old Auto Hood Set Up against Hedge Closes Opening and Provides Protection for New Shrubs

Metal Shield Arrests Dogs

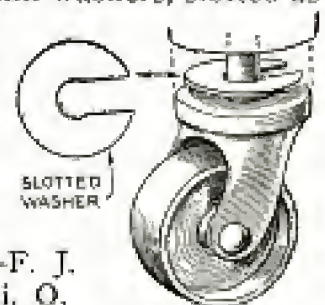
Often a hole in a hedge used by dogs is hard to mend unless a solid barrier is set up. An old auto hood will serve this purpose nicely. After a few unsuccessful attempts to break through, the dogs will forget all about this opening, and you may plant some new shrubs with the assurance that they will not be molested by the canines again.

Exposed Push Button Covered with Door Handle

When a push button is in a position where it is likely to be accidentally pressed by some one leaning against it, an ordinary screendoor handle can be used as a guard. The handle is screwed to the wall with the curved part directly over the button, which arrangement will not interfere with its operation.—George Tompkins, Monroe City, Mo.

Washers Hold Furniture Level

Pieces of furniture, provided with casters, can be leveled to stand solidly on the floor by means of thin washers, slotted as shown in the drawing. Remove the caster and place the washers over the tang, using as many as may be necessary for the purpose.—F. J. Wilhelm, Cincinnati, O.



Fish Kept Fresh in Cellophane



Fish that have delicate flesh and spoil quickly, will remain fresh longer if wrapped in cellophane. Clean the fish as soon as caught and wrap them individually, tightly twisting the ends of the cellophane as shown. This makes the bag practically airtight, and keeps the fish free from dirt and flies.

Runs in Silk Hosiery Prevented by Tape on Desk Legs

Wooden desk legs that are splintered or rough on the edges are very often the cause of runs in silk hose. Such damage can easily be avoided by the simple precaution of applying ordinary adhesive tape over the rough edges so that it extends from the bottom of the legs to within an inch or so of the top. Although this detracts somewhat from the appearance of the desk, it is an effective preventive against this annoyance.—Lowell R. Butcher, Des Moines, Ia.

Condenser Lens Intensifies Flash of Photo Lamp

Greater brilliancy can be obtained from a photo flashlamp by placing it in a box fitted with a condensing lens. This concentrates the light on the subject and subdues the background. Any shape of light can be obtained by cutting a shield to the desired shape and holding it in front of or behind the lens. A box, 6 by 6 by 7 in. in size, with a hinged top, is suitable for the purpose. The lamp socket should be set into the side opposite the lens, so that the base can be placed on any flat surface. The lens is held over a circular opening, just a little smaller than the lens, by means of screweyes. The box

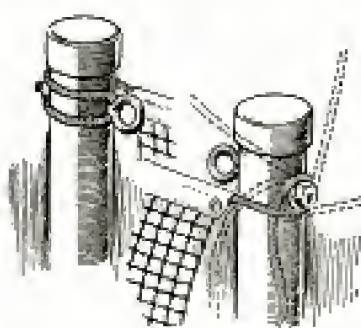
may be painted any color desired, but should be white or aluminum on the inside to increase its reflecting power.

Playing Cards Given Coating of Lacquer

Playing cards can be given a finish resembling that of celluloid, which will make them last longer. Add two parts of lacquer thinner to one part of transparent lacquer and dip the cards in this solution with a pair of tweezers. The cards can be given further individuality by tinting the lacquer.

This Knot Keeps Tennis Net Taut

Tennis nets that have a tendency to sag, due to slippage of the knot tied in the rope at the support post, can be kept taut by tying the rope as follows: If there is an eyebolt in the support, bring the rope around the post and loop it over the projecting end of the bolt, bringing the end of the rope down between the rope and the post so that the pressure of the rope will hold the end firmly against the post and prevent it from slipping. To tighten the net, pull on it close to the post and take up the slack by pulling on the end of the rope. If the bolt does not



project far enough at the back, the rope can be brought around and looped over the eye of the bolt and the end fastened in a similar manner at the back, as shown in the left-hand detail.

Artichokes Smother Quack Grass

Gardens or fields that have become infested with quack grass can be cleared by planting Jerusalem artichokes on the land. These plants make a dense shade and smother out the grass. With a little cultivation, one year usually suffices to smother the grass, but in two years' time the artichokes will kill the grass without any help.

"AERO-BOAT"

A High-Speed Hydroplane

by L. J. GORENFLO

PART II

AFTER finishing the pontoons and trusses as described in the July issue, and fully covered in large blueprints, the fuselage is built. Four frames are needed, one at each truss and another in the tail, as indicated in Fig. 25.

Details of the construction of the frames are shown in Figs. 28 and 29. Note how the top is made of plywood or pressed wood fastened to filler blocks, the latter being necessary for attachment of the $\frac{1}{4}$ by $1\frac{1}{2}$ -in. battens, as screws placed in the edges of plywood would not hold. Frames No. 2 and 3 are made exactly alike and are fastened to trusses No. 2 and 3 respectively. Frame No. 1 is somewhat different, and frame No. 4 can be made later, when assembling the tail. The curved nosepiece is built up from separate strips, as indicated in the left-hand detail of Fig. 25, and is joined to frame No. 1 with two strips, nailed to a filler



The Horizontal Position of "Aero-Boat," after Taking a Sweeping Curve at Top Speed. Shows Its Unusual Stability

block for strength. After completing it, you are ready to put on the center-line batten, which should run parallel to the pontoons. It is first fastened to the mid-section of the nose and extends to the tailpiece, which is detailed in Fig. 33, the batten being nailed to the frames halfway between the top and bottom as indicated in Fig. 28, just above the legs of the A-trusses. By spacing these battens exactly alike on both sides, you will be able to get a beautifully streamlined fuselage. Note how the side battens are held together at the tail by fastening them to a piece of plywood or pressed wood, as shown in Fig. 33. The lower batten of

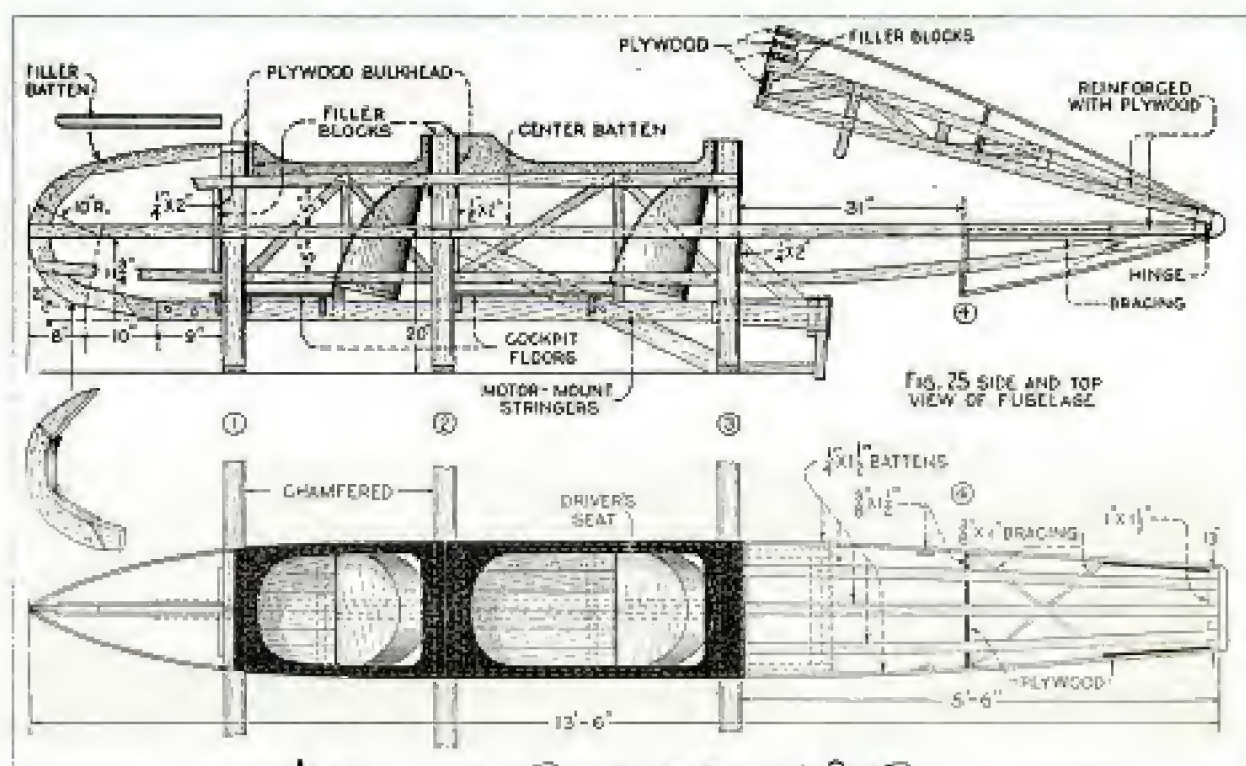


FIG. 25 SIDE AND TOP VIEW OF FUSELAGE

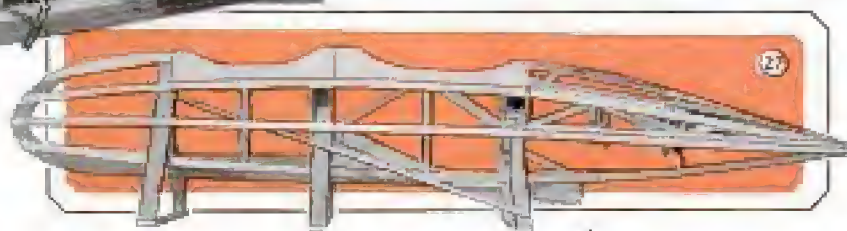
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the hinged tail is placed on the center-line batten, from frame No. 3 to the tail-piece, and the plywood is later cut with a saw between these two battens.

Diagonal bracing for the sides is also necessary as shown in the drawings. Frame No. 3 really consists of two parts, one to hold the body fuselage and the other to hold the tail, and the adjoining edges should, of course, come flush. A vertical piece on each side of the tail holds it in position securely, while a turn-button or a hook and eye at the top serves to keep it in place at the point where it joins the body, as indicated in

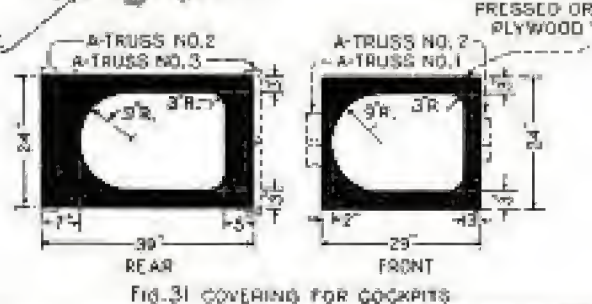
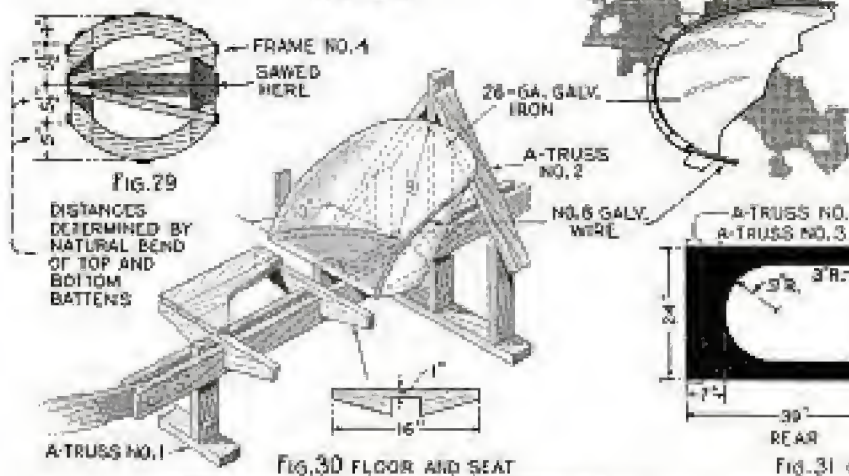
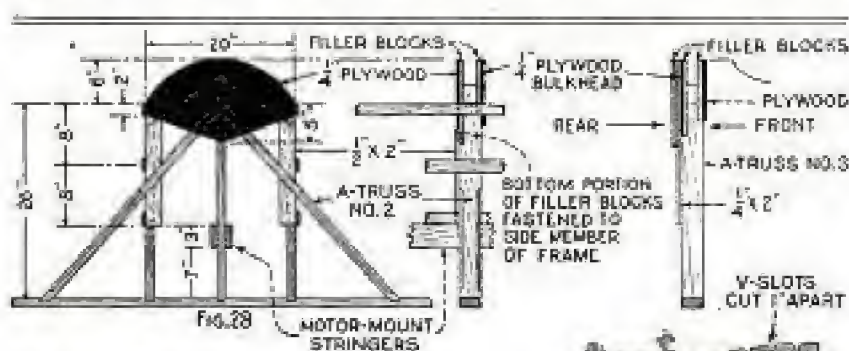
Fig. 36. It is an easy matter to provide a strong butt hinge at the tail and also side-strap hinges to hold the tail up while the motor is being put in place or removed. Another point to remember is to put in the cross bracing before the top-line batten. If the latter is cut before the bracing is inserted, it will be impossible to make the curvature of the tail



conform to that of the body. Frame No. 4 is made in one piece, as shown in Fig. 29, and is cut in half at the point indicated, after which the tail battens are fastened on. Cross bracing of $\frac{3}{4}$ by 1-in. stock in the tail is also highly essential.

The covering or capping for the cockpits is made of pressed wood, cut to the dimensions given in Fig. 31, and the position of these covers is indicated in Fig. 25. Start by screwing the capping down

at the center of the top, driving the screws into the filler blocks. Bend the stock over the curved bulkheads, spacing the screws 1 in. apart. In putting on the front-cockpit cover, you will notice that there is a slight overhang, due to the fact that frame No. 1 is only 18 in. wide, while frame No. 2 is 20 in. wide. Simply cut off this overlap with a saw

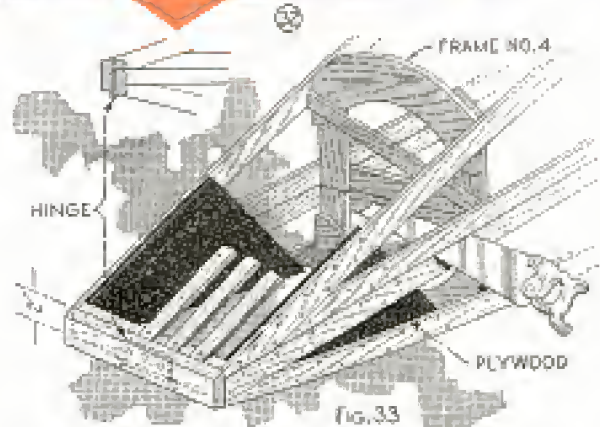
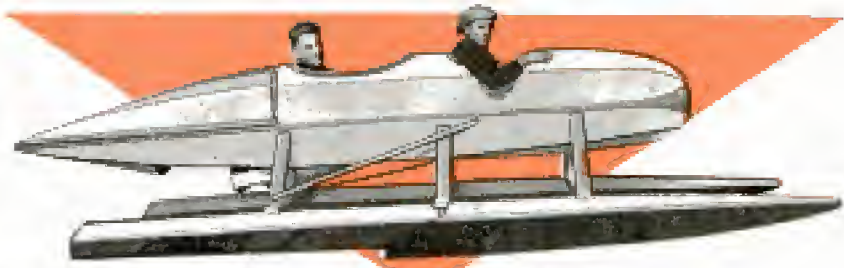


and fasten the covering along the top-line batten with straps, spaced 4 in. apart as shown in Fig. 38.

The "bucket" seats are easy to make and their construction is shown in Fig. 30. The back is a piece of No. 26 gauge galvanized sheet iron, the edges of which are notched and bent over a length of wire. The seats are set at the angle most convenient for riding, which is done by means of a small block of wood. Both the seats and the floorboard, which is also shown in Fig. 30, are supported by the two long motor-mount stringers. Crosspieces, to which the flooring is attached, are notched to fit the stringers and are nailed in place.

At this point it is necessary to install the side braces on the outside of the fuselage, as shown in Figs. 27 and 32. These braces prevent one pontoon from dragging behind the other and also serve to obtain rigidity. One is provided on each side, and they run from the top of truss No. 1 to the bottom of truss No. 3, being bolted to the trusses with $\frac{1}{4}$ by 2-in. flat-head stove bolts. Do not omit these braces for any reason, for the dragging mentioned may cause the two pontoons to tear apart at high speed.

The fuselage is now temporarily removed from the pontoons in order to apply the covering, which is ordinary muslin, waterproofed and stretched by means of airplane-wing dope, this being applied after the cloth has been tacked to the frame. First cover the upper half of the fuselage, as shown in Fig. 26, using a single piece of cloth, 44 in. wide,



and tacking it to the center-line batten on both sides. The over-all distance from the nose to the tail is about 14 ft. Stretch the cloth tightly and tack it down at 2-in. intervals. The holes for the cockpit are not cut until the upper part of the covering has been treated with two coats of clear nitrate wing dope, allowing the first to dry before applying the second. This will cause the cloth to adhere to the cockpit capping, making a neat job, after which it can be trimmed off. The underside of the fuselage is covered with two pieces, tacking one edge of each piece along the underside of the motor-mount stringers

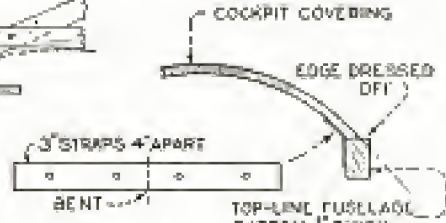
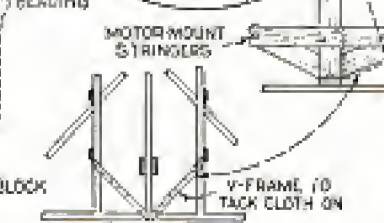
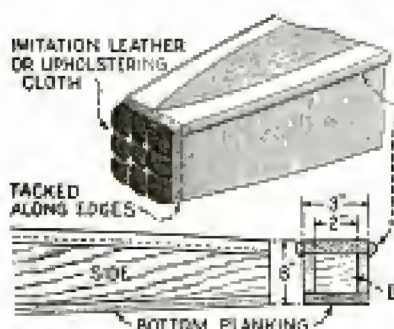
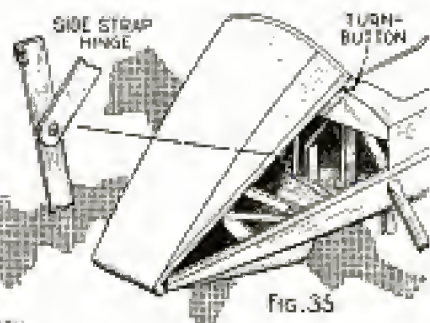
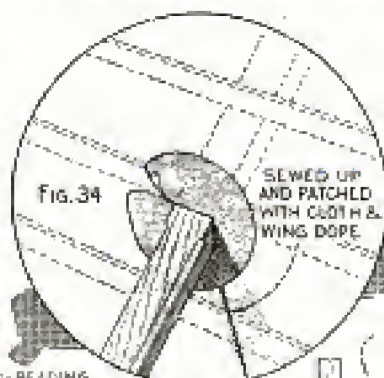
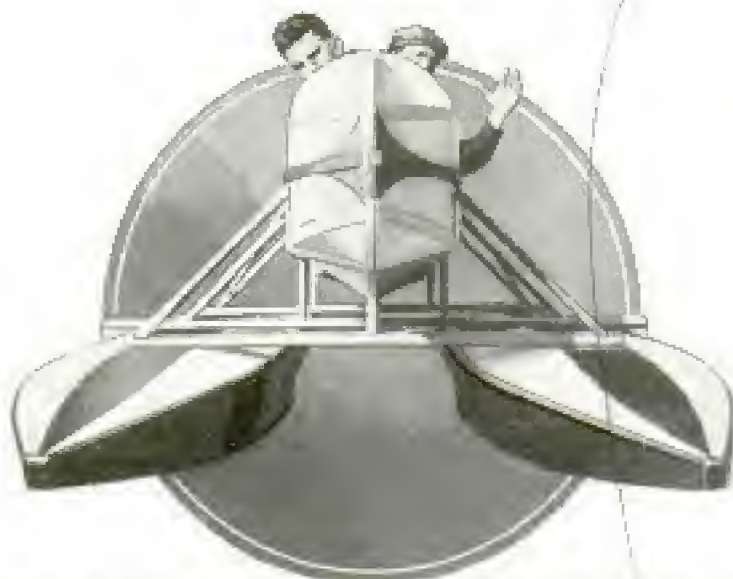


FIG. 36 DETAIL OF PONTOON NOSE

FIG. 37

FIG. 38

*Elto Liv. Outboard
Motor Corp
Milwaukee, Wis*



Here Is "Aero-Boat" When Finished, Showing How Both the Fuselage and Pontoons Are Beautifully Streamlined

and stretching the cloth up to the center-line batten where it is fastened on as before. Try to keep all the tacks in a straight line. Slits are cut so that the cloth can be brought up around the truss legs, the slits being sewn up later, but before the dope is applied. Circular patches of cloth, about 5 in. in diameter, are cut to fit around the truss leg where it enters the fuselage, to give the joint a finished appearance, as shown in Fig. 34. Wing dope is also put on the patch, thereby gluing it to the cloth underneath. The underside of the fuselage, between the motor support and frame No. 3, is left open for the motor. Note from Fig. 37 how a V-shaped frame is provided to car-

ry the cloth directly behind frame No. 3. This is not absolutely necessary, but is advisable, to keep the motor dry. The row of tacks on the center-line batten should then be covered with upholsterers' gimp.

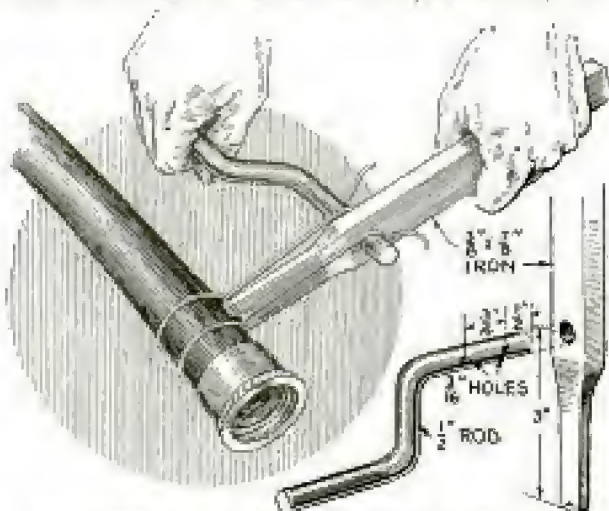
While the fuselage is removed from the pontoons, the latter are also covered with canvas. The method of applying the canvas is similar to that of the cloth on the fuselage and wing dope on the canvas, and is, of course, preferable to paint. A few finishing touches of color to the craft, and it is practically finished, except for reassembling the fuselage on the pontoons and providing the

latter with a nosepiece of leather, as shown in Fig. 36. Also be sure to streamline the truss legs by chamfering the edges. Almost any smart complementary color combination can be used to make the craft attractive. The motor used should be no less than 22 hp., which will drive the boat about 35 miles per hour and over. More powerful motors will develop greater speed. The one used was a class-D four-cylinder motor, which developed a speed of approximately 40 miles an hour. No inboard motor can be used. It is possible to leave the cockpit and step out on the catwalks of the pontoons while going at full speed, without appreciably affecting the course.

Tool Binds Wire on Rubber Hose Connections

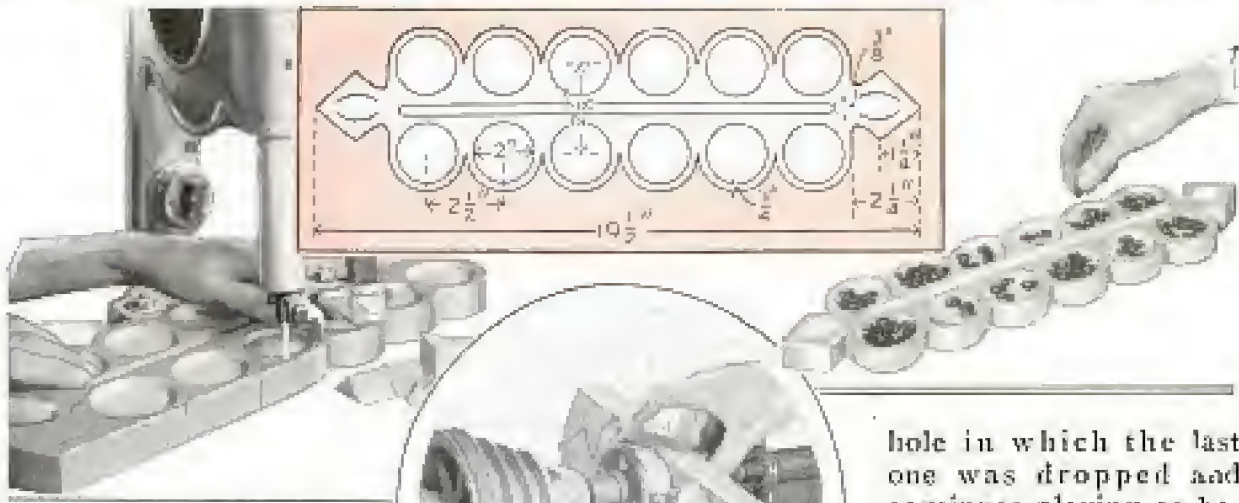
When binding hose connections with wire, this tool will speed-up the work besides making a good joint. It consists of a length of $\frac{3}{8}$ -in. bar iron, with a notch at one end to fit over the hose and a hole drilled 3 in. from the notched end for a rod, which is bent to form a crank. Small holes, to receive the ends of the binding wire, are drilled about $\frac{1}{4}$ in. apart at one end of the crank. In use, the notched end of the bar is placed against the hose over the looped end of the wire, and the free ends are threaded through the holes in the crank. It is then an easy matter to tighten the wire around the hose by turn-

ing the crank and then bending the wire over to lock it.—P. R. Moak, Monroe, La.



Hose Connections Easily Bound with This Tool

AFRICAN "POO" IS A FASCINATING GAME OF CHANCE



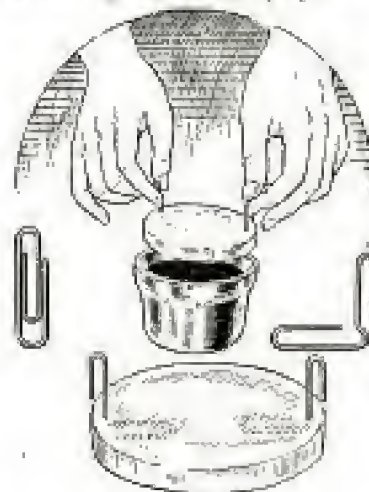
"Poo," or "Mancala" as it is sometimes called, is a game known to many an African hut and is considered the most popular time-killer in many parts of the Dark Continent. It is played on a board somewhat similar to the one shown here, although the native board is equipped with a runnerlike support and is set between two squatting contestants. Get a piece of poplar, or other easily worked wood, $19\frac{1}{2}$ by $5\frac{1}{4}$ by 1 in. in size, and mark off two rows of 2-in. circles which are bored to uniform depth, and then smooth with a circular block as indicated. Emery cloth is used instead of sandpaper, as the latter is likely to tear. After the holes have been finished, nail a $\frac{3}{8}$ -in. square strip of wood between the two rows and cut the board to the shape shown with a fretsaw or bandsaw. Now for the game. The two players seat themselves on opposite sides of the board. One of them takes 98 buttons—the natives use pebbles or cowry shells—and distributes them in the 12 holes, not less than two in each and as many more as desired. The first player starts by picking up all of the buttons in the hole at the right end of his row and drops them into the other holes, one button in each, beginning at the left end of his opponent's row and going toward the right, then working toward the left in his own row. The player continues dropping the buttons in this way until the last one has been deposited, whereupon he takes all the buttons from the

hole in which the last one was dropped and continues playing as before. Eventually he will end by depositing buttons in an empty hole. Then he stops and his opponent takes up the play. However, if the first player stops at a

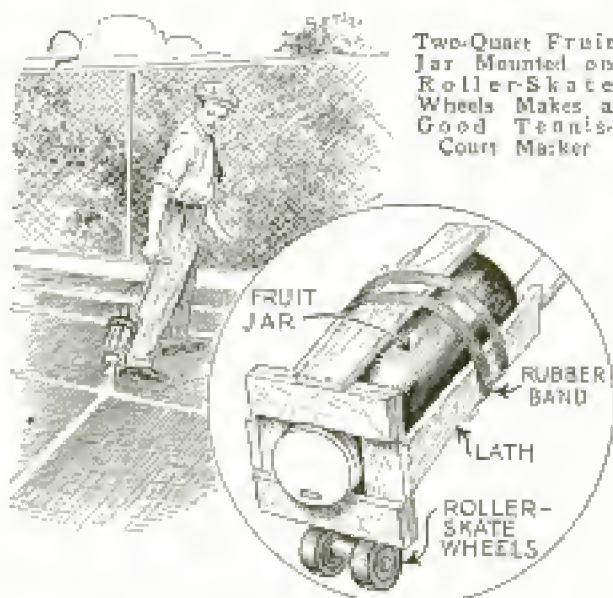
hole holding either one or three buttons, he takes all the buttons of that hole plus those of the hole directly opposite, on his opponent's side. Furthermore, if the holes immediately following this one toward the right in the direction of playing contain two or four buttons, he takes them also. The winner is he who, at the conclusion of a predetermined number of rounds, has the greater number of buttons. Rules can be varied as desired.

Paper Clips Remove Paraffin Covers

Paraffin covers on preserve jars can be easily removed without breaking by imbedding ordinary paper clips in the paraffin while it is poured on. To



do this, bend the clips at right angles and twist the ends to form hooks, which are hung over the edge of the glass before the paraffin is poured into the top of the jar.



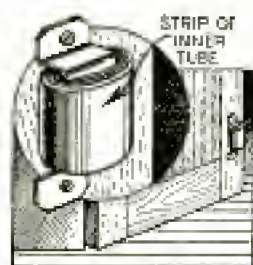
Two-Quart Fruit Jar Mounted on Roller-Skate Wheels Makes a Good Tennis-Court Marker

Tennis Marker Made from Fruit Jar and Roller Skate

Tennis courts can be marked quickly with this improvised marker, consisting of a 2-qt. fruit jar held in a framework made of lath. A pair of roller-skate wheels are attached to the frame and a handle is provided, so that the marker can be pulled along while walking over the court. A rectangular slot, measuring $\frac{1}{4}$ by $1\frac{1}{2}$ in., is cut in the cover of the jar, to allow a uniform flow of the marking fluid, which consists of a lime-and-water solution. The top of the jar projects through the end of the frame to which three short slats and the handle are tacked, the jar being held in position by a couple of rubber bands cut from an inner tube. A crosspiece on the handle provides a good grip.

A Silent Doorstop

A silent doorstop can be made from a length of sheet metal, $1\frac{1}{4}$ in. wide, and a piece of old inner tube. Punch a hole in each end of the strip of sheet metal and bend it as shown. An 18-in. length of old inner tubing is then wrapped around the bent portion of the strip, which is drilled and fastened to the door or wall at a point where the door strikes.



Thread Removes Tight Ring from Finger

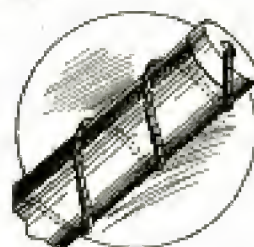
A ring that fits too tightly to be slipped off the finger, can be removed with a length of strong thread and a needle. After threading the needle, wind the thread tightly around the finger up to the ring, starting at the finger tip. When the ring is reached, slip the head of the needle under it and draw the thread through. Now proceed to unwind the thread and you will find that the ring will slip down the compressed finger easily.—Lieut. Don. B. Owens, Jr., Dayton, Ohio.

Mirror Locates Objects Submerged in Clear Water

Submerged objects can be located by holding a mirror at the proper angle to reflect the rays from the sun into the water. If the water is covered with ripples causing poor vision, knock out the bottom of a box and hold the lower edge just below the surface. Reflect the rays into the box, where the water will be free from ripples. This is also a good method of inspecting deep wells when no flashlight is at hand.

Golf-Club Handles Wound with Cord Do Not Slip

The danger and embarrassment of having a golf club slip out of your hand can be prevented with a wrapping of cord. Both ends of the cord are fastened to the handle, and a tack is used for this purpose at the top end. This will provide a grip which is not likely to slip, and it is an easy matter to remove the cord at any time when it is not needed.



Emergency Cement Quickly Prepared

A cement that is strong and can be quickly made in case of an emergency is prepared as follows: The white of an egg and slaked lime are stirred together until the mixture assumes the consistency of paste. The paste must be used immediately as it sets very quickly.

This GALLOPING TEAM

KEEPS *the* BABY BUSY

by
H. W. Magee

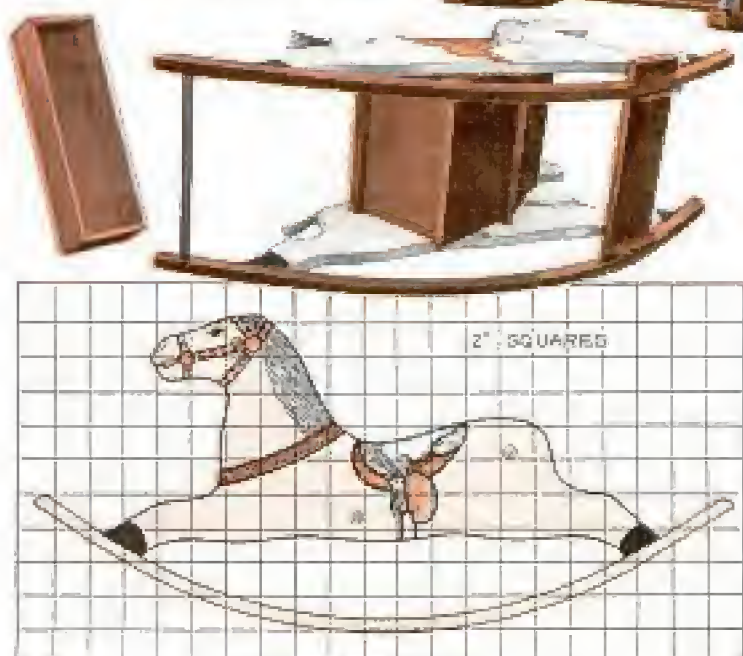
ALTHOUGH not new, this galloping team is one of the best animal toys to keep your baby happy for many hours. Besides merely rocking, the child soon learns to travel all about the house, and if the ends of the rockers are covered with strips of rubber, no scratches or marks will be left on the woodwork.

Poplar is the best wood to use. The rockers should be bent to shape from suitable lengths of the same material, which is a comparatively easy matter when thoroughly soaked in boiling water. It is not advisable to cut the rockers as they are likely to



the seat should run parallel to the sides, and dowel-rod supports are located under the front end of the seat and behind the upper end of the backrest; these two parts are joined together with screws.

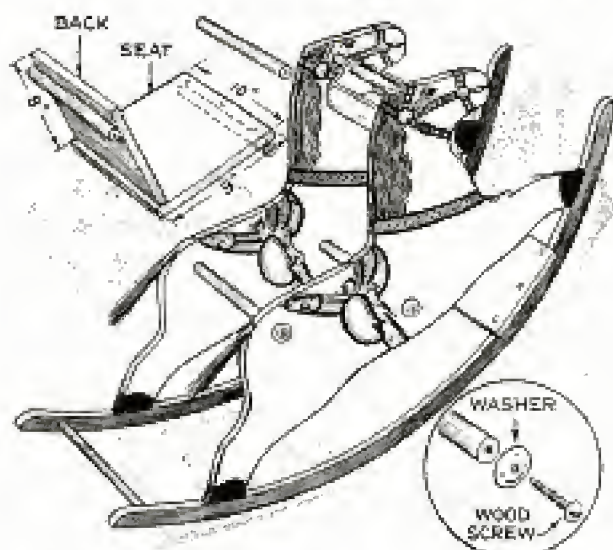
The best method of construction at this point is to fasten a cleat to the inside lower edge of the backrest to hold the rear edge of the seat, which is then screwed to the cleat. The dowel-rod supports fit holes of corresponding size drilled through the sides and are held in place by means of wood screws and washers, which latter should be larger in diameter than the holes. The tray is screwed to the sides and a dowel rod is fitted across the front just above the tray to serve as a handhold. The footrest is attached in the most convenient position for the child's feet. If desired, a dowel rod may also be run across the rear end of the



split where the grain crosses the stock at the ends. Get a large sheet of wrapping paper and rule it off in 2-in. squares; then draw the outline of the horse over these squares as closely as you can to the template given here. Variation from this design is likely to affect the balance. Stock of $\frac{3}{4}$ -in. thickness is used for the horses, while $\frac{1}{2}$ -in. material is satisfactory for the seat, tray and footrest. The grain of

rockers. As strong joints are necessary between the rockers and the horses' feet, 2-in. wood screws are used at these points. In bending the rockers to shape, be sure to get the exact curve of the template and that they are free from humps and hollows. When they are thoroughly dry after bending, take a small plane and round the lower edges slightly.

The completed rocker is given a coat of



shellac and can be painted white or gray, while the saddle and bridle decorations may be of any color that suits your fancy.

Lifelike Food for Aquarium Pets

Aquarium pets such as turtles, frogs, etc., that are kept in the garden aquarium can be "fooled" into eating and kept alive for some time. Many of these creatures will only take food that is apparently alive and kicking. Cut a piece of lean, fresh beef into small pieces so that the animal can swallow it. Draw a length of thread through a piece with a needle, but do not tie a knot in the end of the thread, so that it can readily be pulled out again. Swing the bait back and forth in front of the animal. If hungry, it will immediately take the food, after which the thread can be slowly removed. Turtles, salamanders and newts will take meat in this way, and also some of the snakes. Pets fed in this manner will soon learn to come up to the edge of the aquarium when you approach and wait for the swinging bait. It is a good idea to substitute a piece of liver now and then for the beef.—C. Bernard Peterson, North Evans, N. Y.

Homemade Soap Washes Clothes without Rubbing

A soap, which will wash clothes without the usual rubbing, but only rinsing, can be made of common laundry soap cut into thin slices, 2 lb., sal soda, 2 lb., water, 10 qt. Mix the above ingredients and boil for two hours, after which the solution should be strained. Put the clothes into

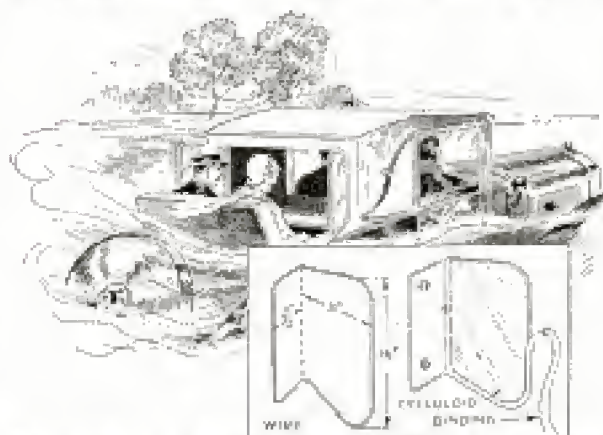
a tub, adding 1 lb. of the soap to every bucket of water. Let the clothes soak in this solution overnight, after which they are thoroughly rinsed.

Improving Pictures Taken at the Beach

Pictures taken at a beach on a sunny day can be greatly improved by shading the object with an unfolded newspaper. This evens up the light so that there will be no dense shadows. As the sunlight is reflected from the sand, plenty of time will be given by setting the camera for normal exposure.

Celluloid Side Wings on Coupe Shield Rumble-Seat Riders

By attaching two side wings of celluloid to the back of your coupe, greater comfort will be enjoyed by those riding in the rumble seat. Although this type of wing was designed for use on convertible models, they can be adapted with equal success to closed models. The wings consist of a wire framework, bent as indicated. A celluloid pane is fitted in the large section and is held in place by means of a cloth binding sewed over the edge. The smaller panel should be inclosed with a piece



The Comfort of Rumble-Seat Riders Can Be Greatly Increased by the Addition of Celluloid Side Wings

of light sheet metal, the edges of which can be bent over the wire frame. The sheet-metal portion of the shield is attached to the back of the car with screws or bolts. In a convertible model or coupe, short bolts fitted with large washers will be found a convenient method of attachment and will not tear the fabric of the top.—Joseph A. Carrera, Dawson, N. M.

WAX CRAYONS AND GASOLINE FOR COLOR-STAINING



Wax Crayons Softened or Dissolved with Gasoline or Turpentine Can Be Used to Make Beautiful Colored Effects on Wood

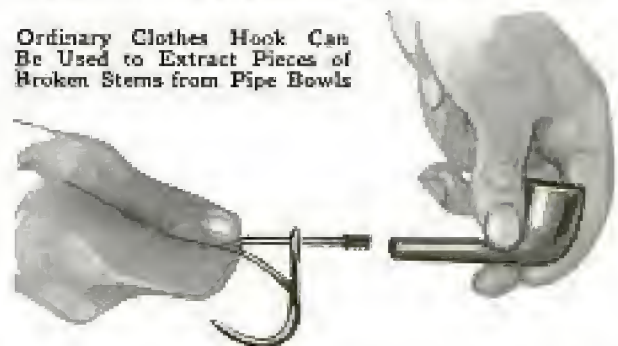
Coloring wood with wax crayons is extremely simple and gives effects that cannot be obtained in any other way. The simplest method is to wash the surface of the wood with a wad of cloth soaked in gasoline. Immediately after washing, rub the surface with whatever color you desire. The gasoline softens the colored wax, allowing part of it to penetrate the wood, much like a stain. You can obtain polychrome effects by applying patches of different colors and merging them by rubbing with a cloth, or you can wash over the colors with a gasoline-saturated cloth to remove the surface wax, leaving only that which has penetrated the wood. Then apply a coat or two of floor wax, preferably liquid, which can be rubbed to a polish. For carved book ends, letter racks and other objects, beautiful two-tone effects can be obtained as follows: Go over the tooled portions with a gasoline wash consisting of $\frac{1}{2}$ teaspoonful of white oil paint and $\frac{1}{8}$ teaspoonful of warm gray oil paint mixed together in a cupful of gasoline. Apply the wash with a brush. While the wash is still damp, rub the desired color of wax crayon into the background. Another method is the following: First color the wood with crayon and then rub lightly with a rag dipped in turpentine. This softens the wax so that it penetrates into the wood and at the same time removes the surplus. As no other protective coating is applied, the crayon itself produces a surface that is easily cleaned. A crayon paint can be made by cutting the crayon into small pieces, pouring turpentine over

them and warming slightly, this being done by putting the container in a hot-water bath. Stir thoroughly until mixed and apply with a rag or brush. You can produce almost any hue by mixing colors in this way. If it is desired to remove the coloring from the wood, wash with turpentine, although small spots and lines can be scraped clean with a knife. Crayons can also be used for coloring other surfaces than wood, as for instance, plaster, pottery and wall-board. When purchasing crayons, be sure to get the kind made of wax, as other kinds are not adapted to this purpose.

Broken Pipe Stem Can Be Removed with Clothes Hook

An easy method of removing a broken piece of pipe stem from the bowl end without damage, is to drive a clothes hook into the broken piece, which can then be readily pulled out. The threaded

Ordinary Clothes Hook Can Be Used to Extract Pieces of Broken Stems from Pipe Bowls



end of these hooks will make a snug fit in most pipe stems.

Animal Heads Hold Children's Towel Rack



Juvenile Towel Rack of Animal-Head Design Stimulates Tidiness in the Bathroom.

Two animal heads, holding a towel rack for the children, form a pleasing and useful addition to your bathroom. The heads, which may represent any animal you choose, are cut from $\frac{1}{2}$ -in. stock. By clipping the heads from magazines and crosshatching them in small squares, it is easy to duplicate the design on a larger sheet ruled off in 1-in. squares as shown. Drill a hole to receive a rod in the approximate position of the mouth, which is then formed by cutting a narrow slot. Both heads are held on a suitable base of $\frac{1}{2}$ -in. stock, by means of screws, driven in from the rear, and the length of the base depends on the available space where the rack is to be placed.

Protecting Rustic Timbers

To prevent the bark from flaking off logs used in rustic structures, the following methods have been found effective: First, the timber should be cut late in the summer. Score it on two sides; that is, cut off two narrow strips of the bark, for the entire length. Pile the timber in the shade, in an open pile, to allow thorough circulation of air. Allow the timbers to season until the following spring or summer before using them. A second method requires that the timbers be cut and

seasoned as just described, and, in addition, the ends, stripped portions, and knots be coated with coal-tar creosote, using one coat a few days after the timbers have been cut, and another just before using them. The third method also requires the timber to be cut in late summer, and to be seasoned until the following spring or summer, but the bark is not scored. When the timbers are in place, the bark is tacked on with large-headed nails, placing one to each square foot of surface. Paint the nail heads to resemble the color of the bark. The fourth method is perhaps the simplest, in that the bark is tacked or nailed on without particular attention to the time of cutting or other treatment. The nailing method has been successfully used by one western company which maintains numerous rustic hotels, and also on a large rustic building erected for exposition purposes.

A Water Gate That Will Not Wash Away

Washing away of water gates across creeks can be prevented as follows: Set a post on each side of the creek and fasten poles to one of them with wire which will permit them to swing around. Cleats are nailed on the other post at an angle, on the downstream side, to hold the free end of the poles. When the creek rises, the poles will be forced off the cleats and will swing around to the opposite bank where they are pivoted, but will not float away.—H. F. O'Neal, Noblesville, Ind.

Flashlight Mounted on Gun Barrel for Night Hunting

As an aid in shooting rats, owls and other night-prowling animals, an ordinary flashlight, attached to the end of the



Shooting Rats, Owls and Other Animals Is Easier with a Flashlight Attached to the Gun Barrel

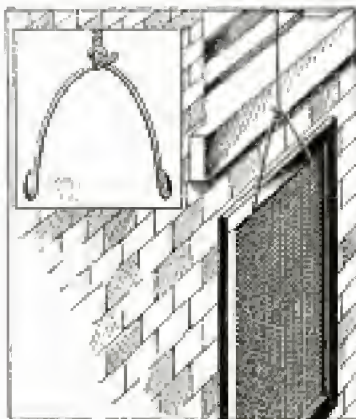
gun barrel, will provide light, where it is needed. Tape is used to bind the flashlight on the barrel securely.

Static Removed from Mimeograph Paper

Mimeograph operators often experience trouble in getting the paper to drop quickly and smoothly into the receiving tray. This trouble is usually caused by the sheets of paper becoming charged with electricity when passing through the machine. By placing a length of metallic tinsel across the discharging end of the machine so that it will touch the underside of the paper as it comes out and also touch the metal frame of the machine, the charge is removed. Talcum powder dusted on a sheet of paper and run through the machine will also help.

Hook Aids in Installing Screens

For putting up screens in windows above the first floor, this hook will be useful. It consists of a 12-in. length of rather heavy wire bent to a U-shape, the ends of which are formed into small hooks

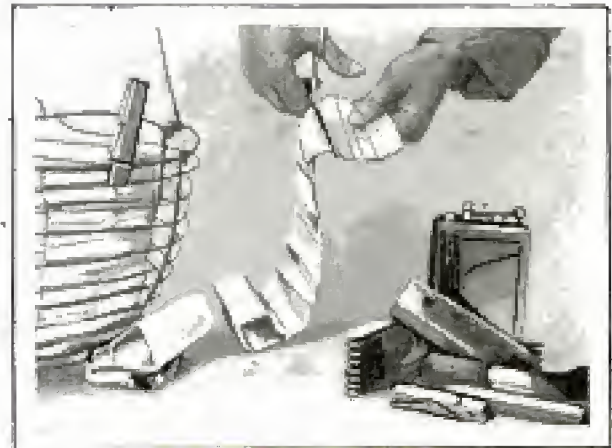


fled to a sharp point. Fasten a rope in the center so that the hook can be lowered to pick up screens set against the side of the building on the ground. —Ray J. Mar-
ran, Kansas
City, Mo.

How to Make Disappearing Ink

A writing fluid that will disappear and can be caused to reappear when desired can be made as follows: Mix linseed oil, 30 drops, ammonia, 1 fluid oz., and water, 5 fluid oz. To make the writing appear when this ink is used, dip the paper in water. As soon as the paper dries the ink will disappear again.

For rolling dough to a uniform thickness, place wooden strips along two sides of the dough; then roll the ends of the rolling pin over the strips.



Piece of Tinfoil Placed on the Inside of a Wire Flower Basket Forms a Good Lining

Flower Basket Lined with Tinfoil

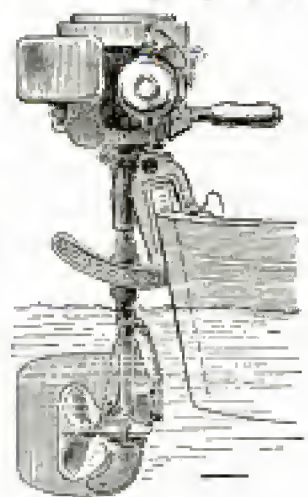
Wire flower baskets of the hanging type can be lined with ordinary tinfoil. If an old Ford coil is available, break the case and remove the condenser. Unwind it and you will find enough tinfoil and wax paper to line the basket. It is advisable to leave the wax paper on the inside of the tinfoil, as this will strengthen it.

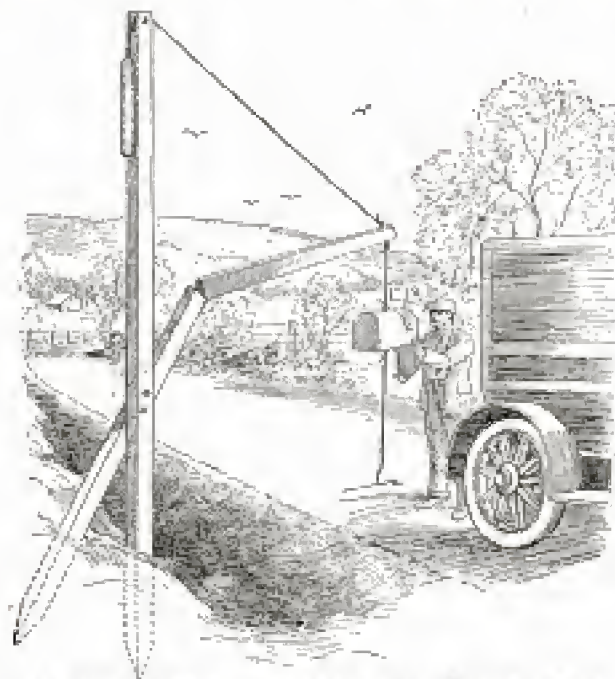
Concrete Floors and Walls Reinforced with Old Auto Frames

Old automobile frames can often be used to advantage as reinforcement in concrete work. Garage floors, foundation walls, piers, and similar jobs, are a few instances where the frames may come in handy.—Walter Harvey, Baltimore, Md.

Detachable Rudder Aids Steering of Outboard

Steering an outboard motorboat is almost impossible when coasting up to a dock or pier with the motor shut off. A sheet-brass rudder extending behind the propeller will remedy this trouble. Small holes are drilled and tapped in the flat part of the propeller-shaft housing and the rudder is bolted on, it being cut out to clear the propeller.





Mail-Box Support, Equipped with Counterweight, Holds Box Clear of Road Traffic

Counterweighted Mail Box Clears Road Traffic

A counterweighted mail box that will be accessible to the mailman but entirely out of the way of traffic, can easily be constructed from three lengths of 2 by 4-in. stock. Two of these are hinged together and set up at an angle so that the end carrying the mail box will be about 10 ft. above the road, while the third forms a vertical support having a pulley at its upper end. A rope running over the pulley and attached to a counterweight is tied to the mail box. In use, the box is pulled down and will return to its normal position as soon as released.—J. J. Brindos, International Falls, Minn.

Cutting Glass Straight on Newspapers

Several sheets of newspaper, cut to the desired size, will provide an accurate line to follow when cutting glass. Place the paper under the glass and follow the outline.—H. A. Insinger, St. Charles, Mo.

Window Wiper Used to Spread Wood Filler

For spreading and removing surplus wood filler after it has been applied to a floor, an ordinary window wiper will be found useful. The advantage of this over the usual method of using a piece of bur-

lap is that it forces the liquid along and fills all cracks or small nail holes that may have been overlooked. After going over the floor with the wiper there will be so little filler left that it can easily be wiped up with a cloth when fairly dry.

Fence Posts Pulled with a Tractor

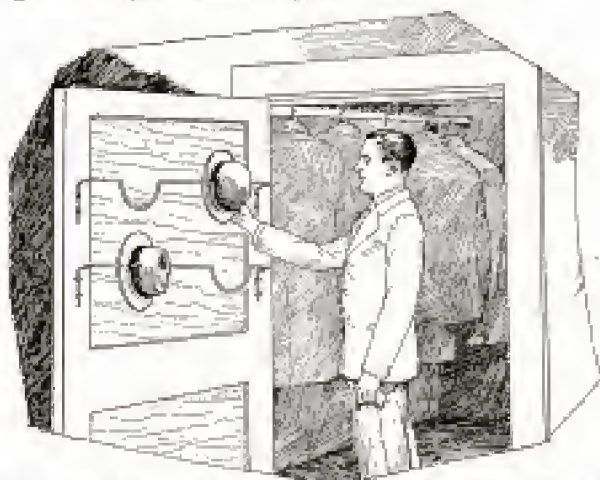
Fence posts can be pulled easily with a tractor. Back the tractor wheel close to the post to be pulled and fasten a chain around the post close to the ground. Run the chain up over the wheel and fasten it to one of the lugs. By running the tractor forward slowly, it is an easy matter to pull up the post.—Harold Rose, Coleridge, Nebr.

How to Make a Good Compost

For potted plants a rich compost can be made as follows: Scoop up ordinary sod and place it in a pile with the grass side down. A layer of stable manure is then spread over it, and more sod piled on. Repeat this process until a pile of the desired size is obtained. After four to six weeks, the sod and manure are thoroughly mixed and the compost is ready for use in potting plants, or as a fertilizer for outdoor flowers.

Hat Rack on Closet Door Saves Space

Where closet space is limited, the illustrated hat rack will be found convenient. It is made from a length of stiff wire, bent to the shape shown and fastened to the inside of the closet door with staples.—Eugene Poplawski, Depew, N. Y.



To Save Space, This Convenient Hat Rack Is Stapled to Inside of Closet Door

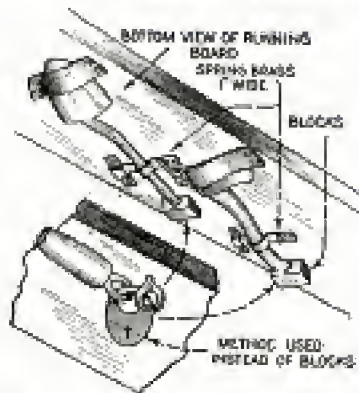
Mercuric-Chloride Solution Kills Parasites on Flower Seeds

Before planting flower seeds, have your druggist make a one-tenth-per-cent solution of mercuric chloride in water, and soak the seeds in it. As mercuric chloride is a poison, be sure to exercise care in using it. Most seeds can be kept in the solution for 15 minutes without injury. After removing them, rinse the seeds in clean water and plant immediately. It is advisable to throw away the poison if you have any left, instead of letting it stand around.

Hookless Fastener Improves Dust Bag on Vacuum Cleaner

Dust bags on vacuum cleaners can be made to open easier by using a hookless fastener. Starting at the top of the bag, cut a slit down the side equal to the length of the fastener and attach it in the usual way.

Camp Ax and Shovel Can Be Held under Running Board



Spring brass clips and catches, fitted on the underside of the running board, will hold a camp ax and shovel securely and entirely out of the way. Wooden

blocks at the end of the handles prevent the tools from slipping out of the clips. Another method of locking them is to drive screweyes into the end of the handles and the running board to receive a padlock, as shown in the lower detail.

Solution for Waterproofing Canvas

Canvas can be waterproofed by dipping it in a solution consisting of gum tragacanth, 50 gr., dissolved in 1 gal. of water, and adding lead acetate, 2 oz. The gum should be allowed to swell in the water several days before adding the lead acetate.



Sawhorses Having Single Legs Are Convenient for Ripping Long Stock

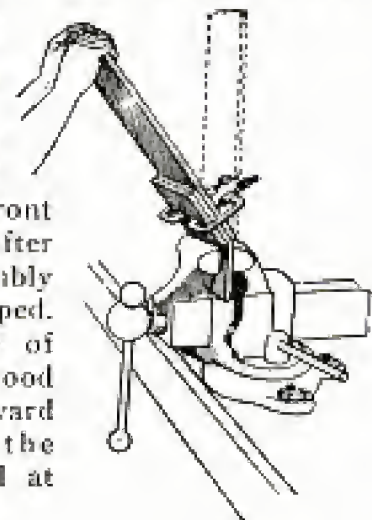
Sawhorses with Vertical Legs for Ripping Boards

Sawhorses having a single vertical leg at each end, instead of a pair of legs set at an angle, will be found convenient for ripping long stock. The legs are nailed to the top member with a suitable brace, toenailed on to provide rigidity. Feet are cut from 1 by 4-in. stock and nailed across the bottom of the legs.

How to Bend Heavy Sheet Metal at Sharp Angles

For bending heavy sheet metal, mark the work at the point where it is to be bent, and place it in a strong vise with the top of the mark just above and parallel to the top of the jaws. A piece of 1 by 4-in. wood, 2

or 3 ft. long, is placed on the back, and a smaller piece of sheet metal is placed in front of the work, after which the assembly is securely clamped. Grasp the top of the piece of wood and pull it forward slowly, and the work will bend at a sharp angle.





Hook on End of Broomstick Used to Free Buried Corn When Cultivating

Hook Uncovers Small Corn

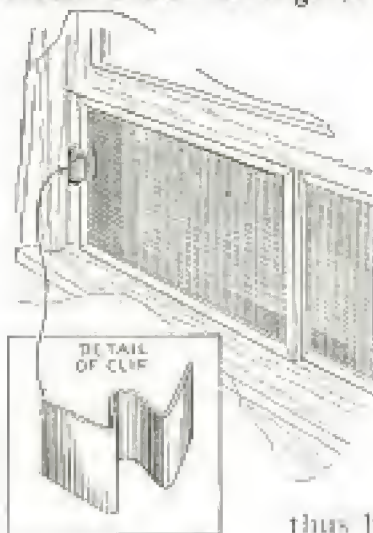
When cultivating, small corn is often covered with dirt. By bending one end of an iron rod to a right angle and fastening it to a short broom handle, a hook can be formed to uncover corn quickly, and without the necessity of the operator getting off the seat.

Anti-Rattle Clip for Folding Screens

Folding screens sometimes rattle due to the frame being too small to fit snugly into the window slide. This trouble can be prevented by bending a strip of sheet metal around the edge of the screen frame

and turning the ends back in the opposite direction to form wings, as shown in the detail. In use, the clip is slipped over the frame with the wings pressing against the side of the window slide,

thus holding it firmly.



Renewing Old Paint Brushes

Paint brushes that are apparently worthless, usually due to improper cleaning, can often be renewed as follows: Place the brush on a flat surface and cut off the short paint-clotted bristles close to the ferrule, about $\frac{1}{8}$ in. deep. Then give the remaining bristles a thorough cleaning with a wire brush, to remove all traces of dried paint, and dip the cleaned brush in turpentine or benzine, after which the treatment with the wire brush is repeated until the desired result is obtained and all the bristles are cleaned thoroughly.

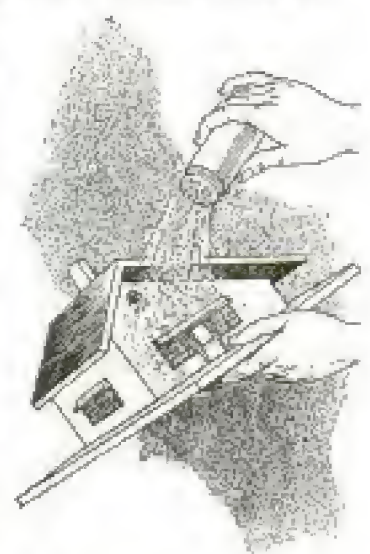
Road Oil Is Good Roof Preservative

Farmers around Arthur, Ill., are cutting their roofing-paint bill to almost nothing by using common road oil as a substitute. This oil costs less than 10 cents a gallon and has been found entirely satisfactory for the purpose. After being thinned by heating, it is spread on with ordinary brushes in the usual way. It gives a light-brown color to new shingles and a darker shade to old shingles and other roofing materials, which is not at all objectionable.—Oney Fleener, Chicago.

Stucco Finish for the Bird House

Bird houses can be given a very attractive stucco finish by applying a thick coat of paint and then throwing on some fine sand while the paint is still tacky. An ordinary salt shaker will do nicely and different-colored sands should be used.

For convenience in handling, the house can be temporarily fastened to a board.

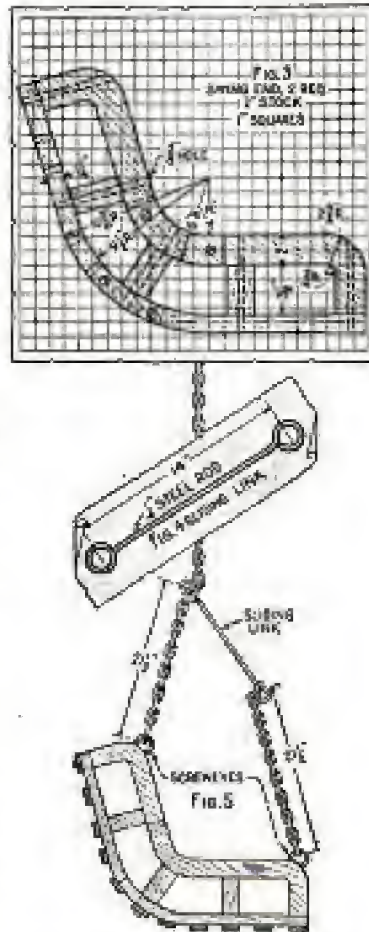


¶To prevent part of the liquid from running down the sides of a bottle while pouring, warm the lip and rub it with paraffin on the top and side.

SWING FOR THE GARDEN REVERSES AT YOUR TOUCH



Installed in the summer cottage or used on the lawn, this reversible swing offers a two-way sitting position which may be changed any time by simply touching the back with the hand and pressing down. You will notice that the swing differs in shape from the usual type as the chains are fastened by means of two long bars or sliding links. First make the two endpieces from 2-in. stock and assemble them as shown in Fig. 3. Lay out the design on a piece of paper ruled off in 1-in. squares. The dimensions and curves, being essential, should be reproduced accurately as given here. The extreme curve does not permit the sections to be cut from one piece of stock and it is therefore necessary to use two pieces, half-lapping them together as shown in Fig. 1. Apply glue to the joining edges and countersink screws into the stock so that the holes can be plugged. Fig. 2 illustrates the method of assembling. Long eyebolts are used at the extreme ends, and not only serve to hold the wood together but also provide support for the chain. Ordinary $\frac{3}{8}$ -in. carriage bolts of sufficient length to extend through both curved portions and the $\frac{3}{4}$ by $1\frac{1}{2}$ -



in. pine slats, which form the bottom, are inserted through two filler blocks. Between the major slats there should be two other slats, making 13 slats in all, though only 11 are shown in Fig. 5. The intermediate slats are fastened to the frame with small bolts, inserted from the top, at the points indicated by dotted lines in Fig. 3. The holes should be plugged to make a neat job. A strap-iron band may be fastened across the underside of the slats, midway between the ends, for reinforcement, if the slats show any tendency to sag under pressure, which, of course, depends on the length of the swing, and this, in turn, can be varied to suit your taste. A 5-ft. swing of this type will meet average requirements. The actual hanging of the swing

is something which must be done "just so" in order to insure satisfactory results. First of all the two sliding links are made. Fig. 4 gives the dimensions and these must be followed exactly. The stock is $\frac{1}{4}$ -in. mild steel, and may be hammered cold, if you do not wish to take the piece to the blacksmith. Two short pieces of chain, each $21\frac{1}{2}$ in. long, are fastened to the eyes of each link. The free ends of



Cutting the End Frames for the Reversible Swing Takes Very Little Time on a Bandsaw

the chains are then hooked to the eye-bolts on the swing. The main chains, which support the swing, are fastened to the sliding links so that they will slip over them as shown in Fig. 5. It is then quite apparent that, as long as the swing is left alone, its position will be fixed. When the sun becomes too bright, or when the scenery on the other side of the swing is more interesting, the mere act of pushing on the back of the swing will turn it over. In making the swing, remember that the dimensions for the chains and sliding links must be followed as given, otherwise the swing will not operate satisfactorily.

Beads Strung without a Needle

When no needle is at hand, beads can be strung by moistening the end of the thread with glue. Press out the surplus glue and roll the end of the thread between the fingers to a fine point, then let it dry.—Alton Adair, Stamford, Conn.

Creel Closed with Hookless Fastener to Keep Out Flies



Attached to the lid of a fishing creel, a hookless fastener will be found effective in keeping out flies, while affording easy insertion of the fish, when the hook is pulled open. Of course, the holes in

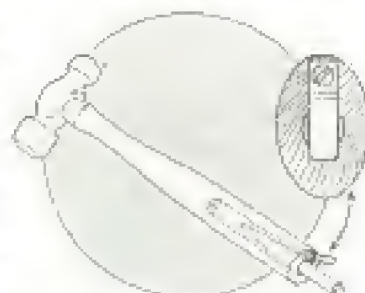
the side of the creel for the carrying straps should also be made flyproof by wrapping adhesive tape around the straps and pushing it into the holes.

Cement for Glass and Pottery

A cement for mending glass and pottery can be made by mixing plaster of paris with the white of an egg or with white shellac. After the cement has hardened, the surplus is smoothed down with sandpaper, and the filling cement can then be colored to match the surface of the piece repaired, using ordinary water colors. To obtain a glossy finish, apply white shellac with a fine camel's-hair brush after the color has dried.—Francis W. Henry, Pottsville, Pa.

Hammer Handle Holds Center Punch

A hole drilled in the end of a hammer handle as illustrated, provides a convenient holder for a center punch. A small metal strip fastened above the hole with a wood-screw prevents the punch from falling out.



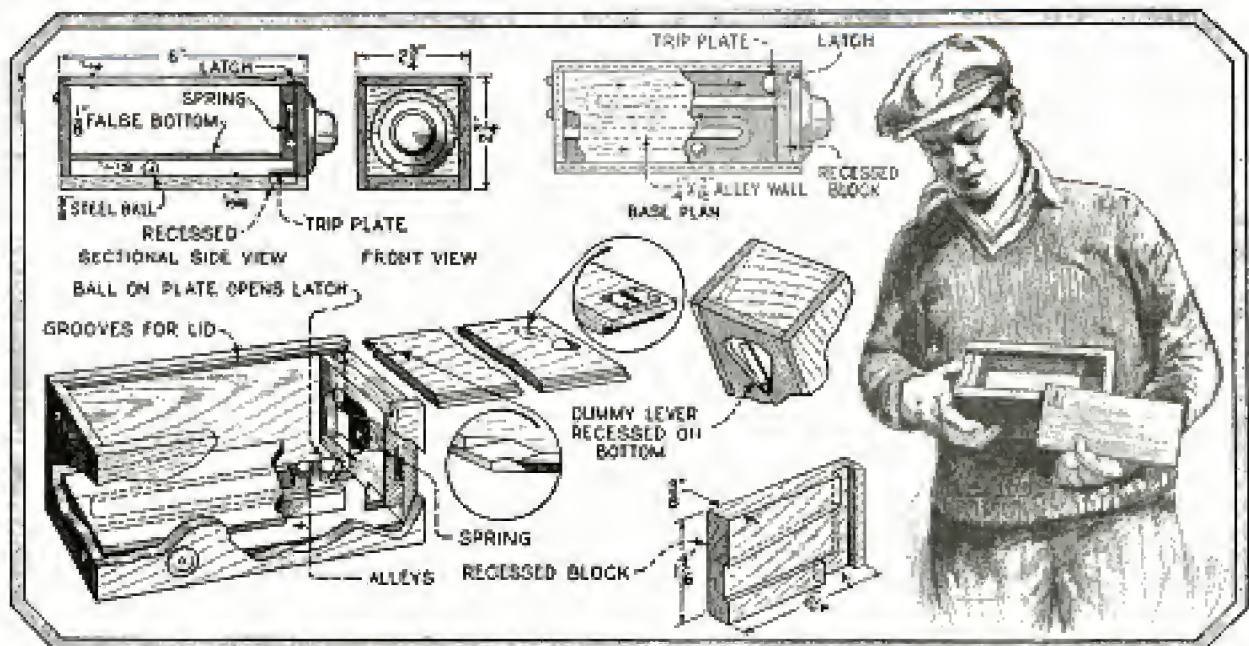
Household Paste Has Many Uses

A satisfactory household paste can be made by mixing flour and cold water, 2 cupfuls of each, and adding 2 teaspoonfuls of powdered alum while stirring. When thoroughly mixed, pour in 2 cupfuls of boiling water. Then place the mixture over a fire and boil until thick, after which 1 teaspoonful of essence of peppermint is stirred in as it cools. This paste will keep indefinitely in small jars fitted with tight covers.

Filler for Chipped Bakelite

When objects made of bakelite become chipped, they can often be refinished by filling the spots with melted hard rubber, which can be obtained from old combs, etc. The cavities should be roughened before applying the melted rubber and after it has dried, the spots may be polished.

STEEL BALL OPENS SECRET LOCK ON TREASURE BOX



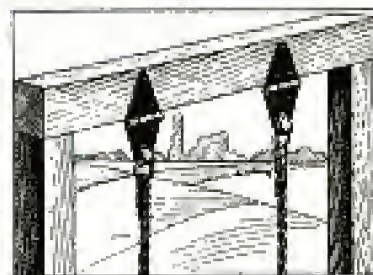
A Rolling Ball Is Used in This Treasure Chest to Open the Secret Lock, and Only by Bringing the Ball through a Maze of Alleys Can the Latch Be Sprung

This secret lock for a boy's treasure box is opened by a steel ball dropping on a small plate, which releases the latch. Alleys for the ball are arranged under a false bottom, and the box must be twisted and tilted in a certain manner before the ball reaches the trip plate. If desired, a more complicated maze of alleys than the one shown can be laid out. Use $\frac{1}{4}$ -in. wood for the sides, ends and lid, and $\frac{3}{8}$ -in. material for the bottom. Sheet metal can be used for the trip plate and latch, although duralumin was found preferable. First make the latch assembly, with a light brass spring mounted on the front end of the box. A tire-valve spring, straightened out and bent to the shape shown, can be used. Next, chisel out recesses in a block to fit over the latch piece. If neatly made, the latch will slide freely in its groove without excessive horizontal play. Now lay out the alleys and put on the sides and back, which are grooved near the top to receive the lip of the lid. The grooving can be done with a circular saw. Mortised corners make a better job, but lacking facilities for doing this, use glue and brads. Everything should fit accurately and all joints should be sanded flush and smooth. Make the lip around the lid about $\frac{1}{8}$ in. wide and $\frac{1}{4}$ in. deep, which can also be done on a circular saw. A small recess is cut in the top side to

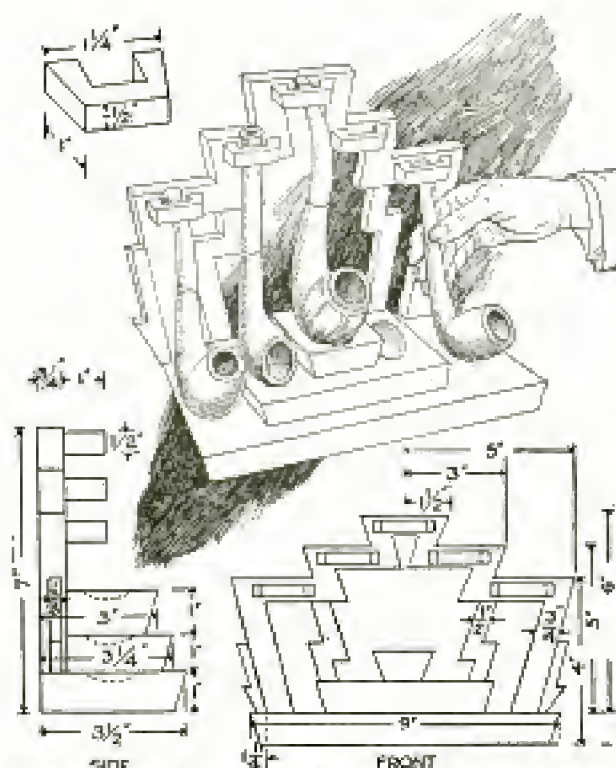
provide a finger grip and a sheet-metal plate, preferably brass or galvanized iron, is set in on the underside of the lid, with a slot for the latch. The plate must be flush with the surface of the lid. Small brads and model-airplane cement are used to anchor it. Careful work is necessary to make the slot engage with the latch. Chisel the lip to a taper at the back end so that the lid will depress the latch when sliding into place. A number of levers, dials, etc., here and there, will help to increase the mystery of the box.

Suspending a Swing from Hinges

Hinges will make a swing safer and will eliminate the danger of the rope wearing through at the point where it is attached to the support. One half of the hinge is screwed to the crosspiece on the posts as shown, while the other half is bent to form a hook, to hold a ring to which the end of the swing rope is tied. The hinges should



be kept well oiled.—J. T. Watkins, Astoria, N. Y.



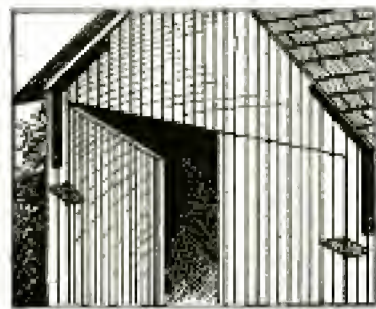
Holding Five Pipes, This Distinctive Rack Makes an Ornament for Your Smoking Table

A Pipe Rack in Aztec Design

Made from almost any kind of wood, this "five-passenger" pipe rack in modified Aztec design can be made in a few hours with a scrollsaw, plane and gouge. The base is built up of three 1-in. pieces, and the back is cut out in zigzag fashion from $\frac{3}{4}$ -in. stock. The pipe stems are held upright by small brackets screwed or nailed to the back, and hollows are gouged in the base to receive the bowls. Be sure to sandpaper all the parts smooth before assembling them and fill all nail holes before finishing, which can be done to suit your taste.

Braces Strengthen End of Garage

Where the end of a shed or garage is nearly all door, a couple of heavy flat-iron braces, bent at an angle as illustrated,



will greatly increase its strength. Sagging sides can often be prevented by this method. Long lag-screws are used to attach

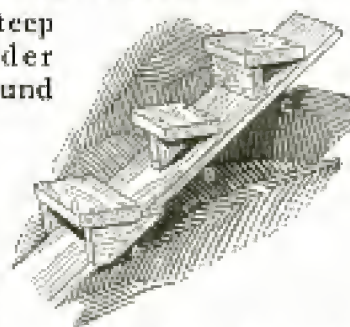
the braces and should be driven into adjacent studs and rafters. Protected in this way, the building will be able to withstand heavy storms without damage.

Maps Tinted Evenly by Using Dissolved Crayons

Maps and drawings on tracing cloth or paper, blueprints or photostats, can be tinted evenly by means of a chamois stump or wad of cotton, moistened with gasoline and rubbed over a wax crayon of the desired color. The advantage of this method over water color is that the paper or cloth will not wrinkle. Besides, color applied in this way has an even density not usually obtained with water colors, and it has been found that, after the color has been well rubbed in with gasoline, it is as permanent as either ink or water color. If large sections are to be colored, and several rubbings on the crayon might cause variation in the density, dissolve part of the crayon in gasoline and dip the stump or wad into the solution.—E. A. Telfer, San Jose, Calif.

Ladder Stair Helps to Climb Grades

For climbing steep slopes this ladder stair will be found helpful. The step treads, and also the blocks supporting them, are made of 2-in. wood

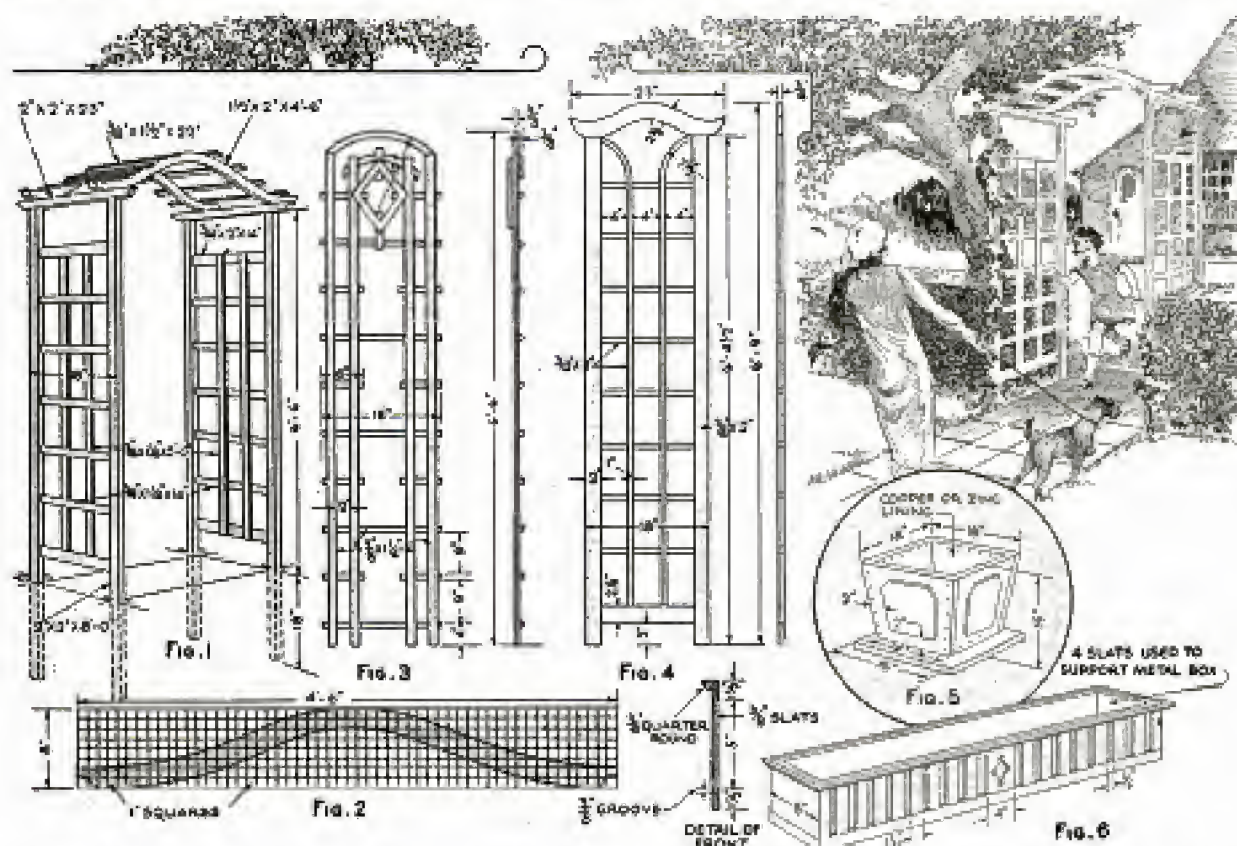


nailed at an angle to a heavy plank. Three methods of attaching the steps to the plank are shown.—James Thomas, Orland, Ill.

Food-Grinder Cutters Sharpened with Grinding Compound

Knives on a food grinder can be sharpened with valve-grinding compound. Remove the knives and apply a thin coat of the compound to the edges, after which they are replaced. Turn the handle back and forth, not more than half of a revolution, and occasionally turn it around completely to bring new surfaces into contact. The operation is similar to that of valve grinding.

AN ARBOR AND TRELLIS WILL IMPROVE THE LAWN



Three most widely used pieces of garden furniture are the arbor, trellis and flower box. Good designs, with dimensions and constructional details, of these are given in the drawing.

The legs of the arbor shown in Fig. 1, should be made of cypress or southern pine, which does not decay easily, and a coating of creosote or tar will also prevent deterioration, or the legs may be set in concrete to give additional rigidity. The sides and top should be built in the shop and not "on the lot," as more accurate work can be done in this way. The curved top frame, Fig. 2, may be cut out on a bandsaw, or if none is available, at the mill.

Unattractive wall spaces on the house or garage can usually be improved by adding a trellis, two designs of which are shown in Figs. 3 and 4. The joints between the outside rails and crossrails are mortised, while the crossings between vertical and horizontal pieces are half-lapped, resulting in a good-looking and durable structure.

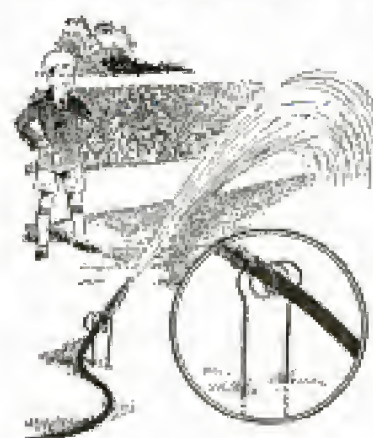
Tree and flower boxes, shown in Figs. 5 and 6, are made of wood but should be lined with copper or zinc, as water will

seep through an unlined wooden box, even though the inside is tarred or painted. Often, especially on indoor window boxes, it is advisable to have a sheet-metal inner box. Three or four slats provide support for the sheet-metal box and allow water to drain off quickly.

A Holder for Your Water Hose

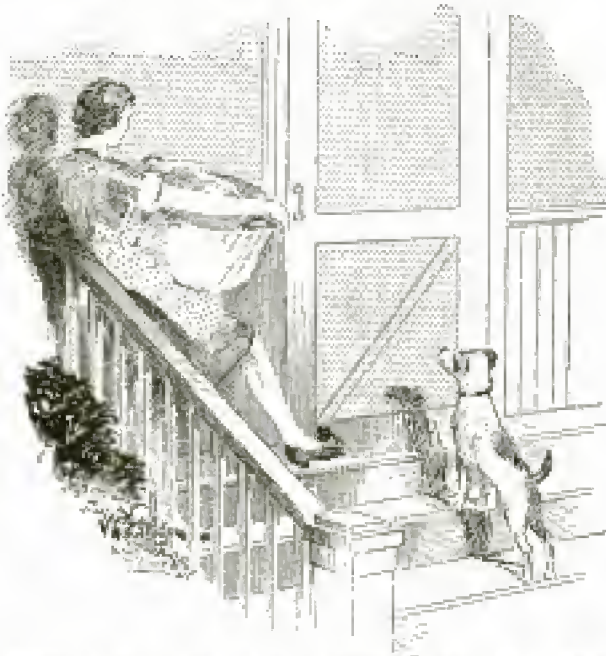
A holder that will keep your water hose in any desired position, for sprinkling the

lawn, can be made from a length of $\frac{3}{16}$ or $\frac{1}{4}$ -in. iron rod. The rod is bent in the middle to form two or three large coils, which hold the hose as shown in the lower detail. Each



end of the rod should be pointed so that it may be easily inserted in the ground.—Joe Chmelar, St. Louis, Mo.

Foot Grip Opens Screen Door



When Both Hands Are Occupied. This Foot Grip Helps to Open the Screen Door

An ordinary rubber-tipped door bumper provides a means of opening a screen door with the foot when both hands are occupied in carrying a load. Bend the end at right angles and fasten the bumper near the bottom of the door, with the bent end projecting downward. The rubber provides a grip for the foot and does not mar the shoe.—R. H. Kasper, Philadelphia, Pa.

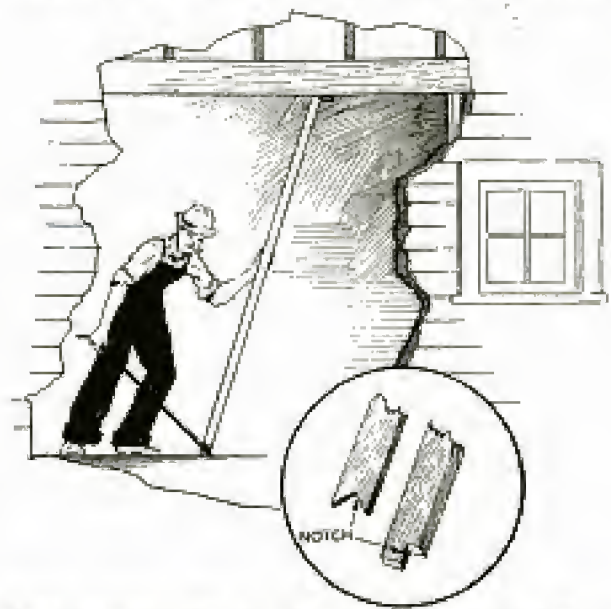
Reducing Culls in Apple Orchards

The owner of a large number of apple trees is forced by business reasons to acquire a thorough knowledge of the orchardist's lore; he becomes a professional. The owner of a few trees usually remains an amateur and knows few, if any, of the kinks of apple culture that are commonplace to the experienced grower, but these little kinks count even when only a few trees are owned. It was so with the man who has two big, thrifty apple trees in his backyard. These trees always set fruit well, but summer hopes always gave way to harvest disappointment; the apples never colored well, and a large portion of them dropped off before the time for picking. Instead of taking these deficiencies as a matter of course, the "backyardist" consulted a professional fruit-grower. He received suggestions which, taken together, solved the problem for

him. Thinning was one of these. Picking the "runts" and culls by hand in summer cuts down the percentage of culls in fall, and vastly increases the size and quality of the remaining fruit. The professional grower suggested at least two pickings, better still, three; this would check the dropping. The apples picked the first time would be the ripest and best colored; leaving them in small piles on the ground, in the sunshine, would help them to color more. Still another suggestion was pruning; to open up the top, and before ripening time, prune out some of the small, leafy branches. The windfall problem is always accentuated by tall limbs which whip. Cutting these back tends to reduce the number of windfalls. Following these suggestions, the home orchardist converted trees which had been principally an aggravation into trees which gave real satisfaction.

Raising Sagged Beams

Sagged ceiling beams can be raised with a plank, a little longer than the distance between the beam and the floor, and a crowbar. Cut a V-shaped or square notch in one end of the plank, as shown in the lower detail, and place the plank snugly between the floor and the beam, then force it toward a vertical position with the crowbar until the beam has been suffi-



Sagged Ceiling Beams Can Easily Be Raised with a Heavy Plank and a Stout Bar

ciently straightened.—Roy Beach, Placerville, Calif.

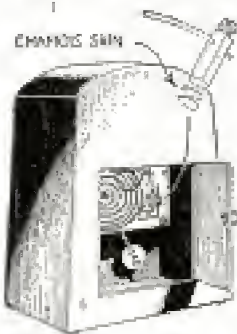
Lime Helps to Remove Stumps

Stumps or rocks in places where blasting is dangerous can be removed with the use of lime. Make as many holes as possible to a depth of 30 in. at various points around the stump or rock and fill them with fine unslaked lime to within 6 in. of the top. Then pour 1 pt. of water into each hole over the lime and finish by filling it with sand. The gas from the slaking lime will pass through the soil and loosen it so that it can be readily dug up and the stump or rock removed.—Dick Stafford, Ft. Collins, Colo.

Repair for Small Roof Leaks

A piece of tin, cut to suitable size and placed between the shingles on the roof, will stop small leaks. Force the tin between the shingles directly over the leak. If the tin is coated with paint or roofing cement, the repair will last indefinitely.—E. A. Darmer, Hasbrouck Heights, N. J.

Padded Clock Hammer Softens "Strike"



Clocks can be made to give a mellow tone by gluing chamois-skin pads to the hammer as shown. Use either glue or hot rosin and allow it to dry thoroughly before you again set the clock to running.

Lawn-Edging Tool Made from Old Scoop

A simple lawn-edging tool can be made from an old coal scoop. One side is bent to a V-shape and the front edge is sharpened. In use, the scoop is pushed along the edge of the sidewalk with the bent side over the edge.—John L. Dougheny, Toledo, Ohio.

A Good Metal Polish

A mixture of water, two tablespoonfuls of ammonia, a tablespoonful of salt and one of fine powdered limestone, makes a good metal polish. Soak a flannel cloth in the mixture, wring out and allow to dry before using.



Sanitary Drinking Fountain for the Farm Attached to Windmill Overflow Pipe

T-Fitting on Pipe Forms Sanitary Drinking Fountain

By attaching an ordinary tee in the pipe that conducts windmill water to the stock or cooling tank, a satisfactory and sanitary drinking fountain can be improvised. The open end of the tee should point upward so that, when the hand is pressed against the outlet end of the pipe the water is forced out of the tee. To avoid splashing of water on the ground, the fitting should be installed inside the edge of the tank.

Removing Seeds in Clothing

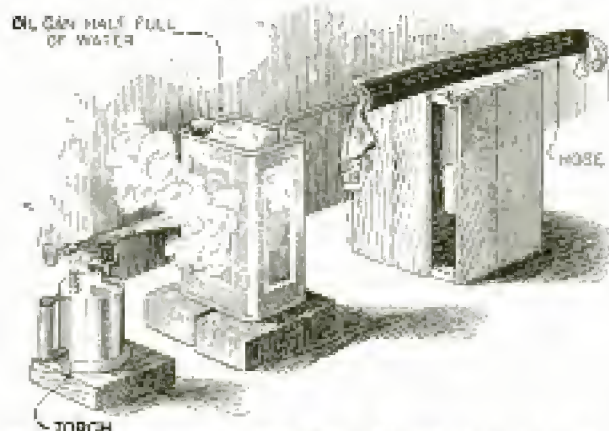
Small seeds, such as "Devils' darning needles," that cling to the clothes, can often be removed by brushing the garments with ordinary household cotton. The cotton catches the seeds and the lint that remains on the clothing can be brushed off in the usual manner.

Canvas Sheath Protects Handsaw

Handsaws can be protected against rusting by keeping them in a canvas sheath, made from one piece cut a little longer than the blade and wide enough to be doubled over and sewed at the edge as shown. This also protects the teeth when the saw is placed in the tool kit.



Steaming Wood in Rubber Hose

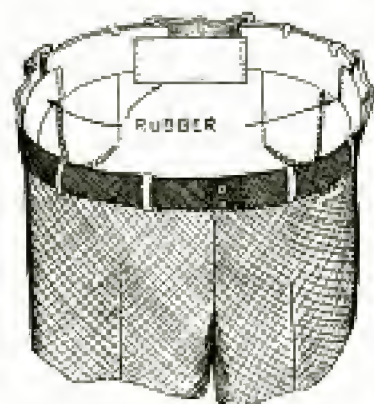


This Steamer for Bending Small Pieces of Wood Consists of Blowtorch, Oilcan and Rubber Hose

For bending small pieces of wood, a steamer can be quickly improvised from a blowtorch, a 1-gal. oilcan and some rubber hose. A length of brass or copper tubing is soldered to the top of the can and bent over at right angles, so it can be slipped into the end of the hose. The pieces to be bent are placed inside and the ends closed with wads of cloth. Water in the oilcan is heated with the torch and the steam is conducted to the hose, the filler opening of the can being closed.

Elastic Strips Replace Belt

Strips of elastic webbing or rubber, sewed on the inside of the waist band of trousers, will aid in holding them without the use of a tight belt, which is often uncomfortable.



The strips should be cut into 3-in. lengths. Draw up the cloth over the elastic as shown, so that the trousers will fit snugly and then sew the strips in place.

Maps Preserved by Cloth Backing

Maps and charts that must be folded and unfolded repeatedly will last much longer if a piece of cheesecloth is pasted on the back. The paste can be made by mixing flour, one part, and water, five

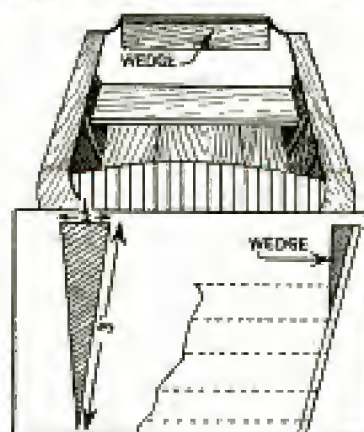
parts, and cooking it over a slow fire for a few minutes. The cloth is laid over the map or chart and the paste spread on, rubbing it into the cloth lightly with the palm. When dry, the map or chart can be folded in any manner desired.—Shepherd L. Witman, Omaha, Nebr.

Shellac Cements Cloth to Iron

To cement cloth to iron, first heat the iron until it is a trifle too hot to touch with the fingers and coat it with shellac. The cloth is then pressed on the surface. The shellac dries quickly and will hold the cloth firmly.

Preventing Loss of Outboard Motor

Chances of losing your outboard motor can be reduced to a minimum by the use of a wooden wedge screwed to the boat transom. The wedge should be 3 in. wide, $\frac{1}{2}$ in. thick at the top and long enough to reach across the transom. The motor is clamped over the wedge, which prevents it from slipping off, if the clamps become slightly loosened.—L. J. Gorenflo, Biloxi, Miss.



Paint Resembles Polished Silver

A paint that will have a finish of highly polished silver can be made by mixing No. 600 aluminum powder with clear lacquer until it takes on a silver hue. The paint should be applied with a fine brush and should be stirred frequently to prevent the powder from settling in the bottom of the can, which will cause irregularities in the finished color. If a high luster is desired, brush on a coat of clear lacquer after the paint has dried. Make up just enough of this paint for the job at hand as it soon spoils if kept.

Iron cotton dresses on the wrong side to obtain a good finish and gloss.

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Three Shortcuts for Your Bandsaw

WOODEN disks of various sizes can be cut in any bandsaw by using the auxiliary table shown in Fig. 1.

It consists of a piece of birch plywood, $\frac{3}{4}$ in. thick and of such size that it will fit over the bandsaw table, to which it is securely fastened by means of two cleats attached to the lower edges of the auxiliary table. A screw driven into the side of one of these cleats is used to lock the assembly on the bandsaw table. A $\frac{1}{2}$ -in. slot is sawed through the plywood, to clear the saw blade when the table is slipped in place, and a nail driven in from the underside, about 1 in. from the end of the slot as shown in the detail, forms a pivot on which the work rotates, a pivot hole being drilled in the work. The auxiliary table is then adjusted so that the distance between the pivot and the saw blade is equal to the radius of the desired

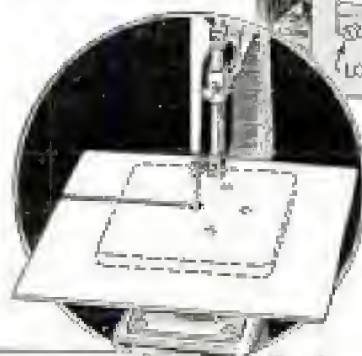
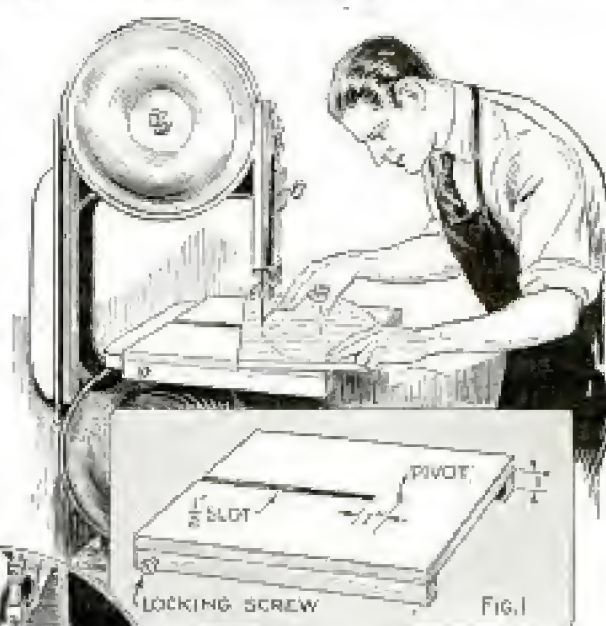


FIG. 2

disk. A cut is made from the edge of the stock to the circumference line of the disk so that the center can be placed on the pivot, after which it is an easy matter to cut a true circle.

In cutting large work on a bandsaw, the small table may not provide sufficient support. A larger one can be added by obtaining a piece of $\frac{1}{8}$ -in. steel or aluminum of dimensions suitable for the work. A slot is cut in this top so that it can be slipped over the bandsaw blade, as shown in Fig. 2. Three holes are drilled and countersunk for screws with which the top is attached to the table, corresponding holes being drilled and tapped in the latter, and flat-head machine screws are used for attachment, the heads being sunk just a trifle below the surface so that they will not interfere with the work. The edges and corners of the auxiliary table should be rounded slightly with a file.

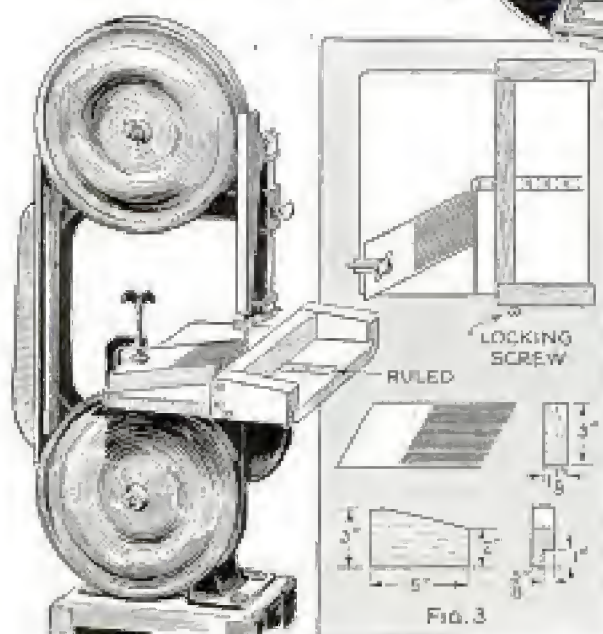
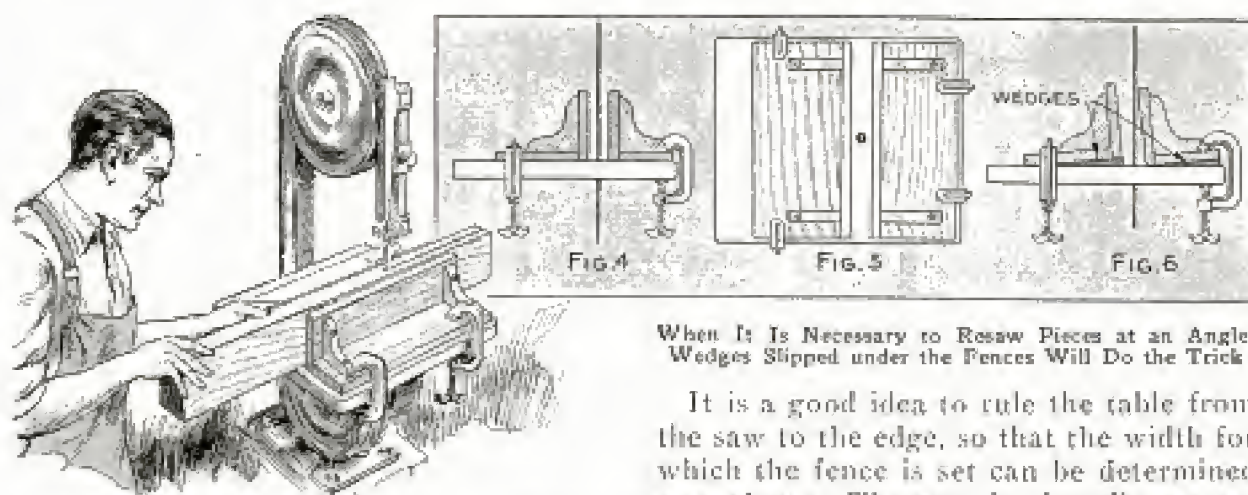


FIG. 3



When It Is Necessary to Resaw Pieces at an Angle, Wedges Slipped under the Fences Will Do the Trick

When using your bandsaw for cutting stock to odd widths, or resawing, which is sometimes necessary in cabinet work, the fence and guide shown in Fig. 3 will be useful. The fence is built up of three parts, which are screwed together and arranged to slide over the edges of the saw table so that the fence will guide the work straight. For this reason it is necessary to rabbet the endpieces $\frac{5}{8}$ by 1 in., so that they slide over the edges, all irregularities on the latter being removed with a file. A locking screw is also provided on this fence, in the same manner as explained in connection with the auxiliary saw table shown in Fig. 1.

It is a good idea to rule the table from the saw to the edge, so that the width for which the fence is set can be determined at a glance. The stop is virtually a pressure spring made of a 6-in. piece of $1\frac{1}{8}$ -in. soft wood, about 3 in. wide, with the ends sawed off at an angle of 30° . One end is kerfed on a power saw, the kerfs measuring about $\frac{1}{16}$ in. apart from center to center. The guide is then attached to the bandsaw table with a C-clamp, as indicated, and is set according to the width of the stock to be cut.

A second method of resawing is illustrated in Figs. 4, 5, and 6, where two fences are employed. These are held to the saw table by means of C-clamps and can be set to saw the stock at any desired angle by using wedges as shown in Fig. 6, one wedge under each fence.

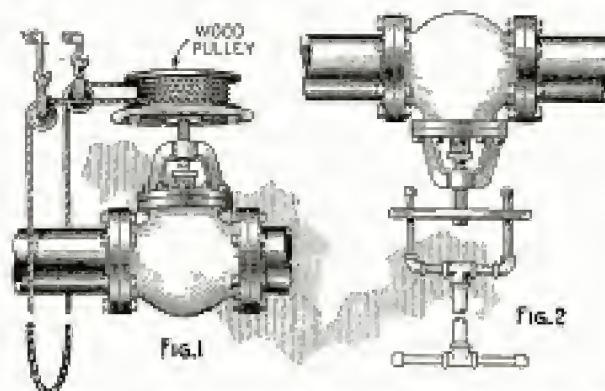
Dump Truck Tows Wrecked Auto

A wrecked auto can easily be towed to the repair shop with a truck having a dump body. Tip the truck body and fasten the front of the disabled car to the rear end of the body with chains. When the truck body is returned to its normal position, the front part of the car will be raised from the ground so that it can be easily towed.

Controlling Overhead Valves

Overhead valves that are not readily accessible, but must be opened and closed rather frequently, can be controlled by means of an extension handle or with a length of rope. In the latter case, a wooden pulley is made to fit the handwheel of the valve, and a length of rope, both ends of which are wrapped around the pulley, is brought over two small grooved pulleys,

and allowed to hang down to a point where it can be reached. Pulling the rope closes or opens the valve. For making an extension handle, pipe and fitting can be used as indicated in Fig. 2, the forked end engaging with the handwheel. This method is the simpler of the two, but can only be used where the handwheel is in an inverted position.



Overhead Valves Out of Reach from the Floor Can Be Controlled by These Methods

Guide for Creasing Large Sheets of Metal

When it is necessary to handle a wide piece of sheet metal at a side-creasing tool, a small pulley for supporting the work allows the operator to use both hands to guide it into the machine. The pulley is attached to the end of a length of $\frac{1}{2}$ -in. pipe, fastened to the bench so that it can be slipped back and forth to accommodate various widths of stock and locked securely at any desired point. The same idea can be applied to support work on machines of similar types.

A Cement for Glass and Brass

To cement brass and glass together, the following preparation is effective: Boil together 1 part of caustic soda, 3 parts of rosin, 3 parts of plaster of paris and 5 parts of water. Let the mixture cool and then apply. It should harden in about 20 minutes.

Lantern Reflector Throws Light on Ground



A lantern reflector that will throw the light on the ground can be made from a piece of brightly polished tin or galvanized iron. Cut and form the tin into a cone so that the hole in the center will be about 1 in. smaller than the diameter of the flange on the draft hood. The ends are bent over to form an interlocking seam. The reflector can easily be removed by unhooking the seam.

Tank Corrosion Prevented by Using Zinc Blocks

When salt water is used in coolers or tanks, a galvanic action is set up in the tank causing corrosion of the steel plates. This can be prevented by suspending blocks of zinc in the tank, being sure that a good contact is made between the tank and the blocks.



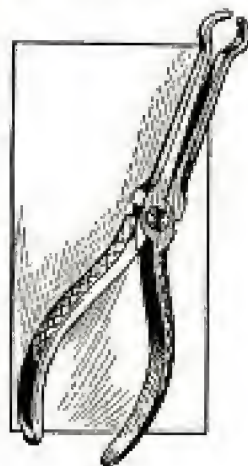
Old Vacuum Cleaner, Provided with Flexible Hose, Salt Bag and Handle, Cleans the Shop

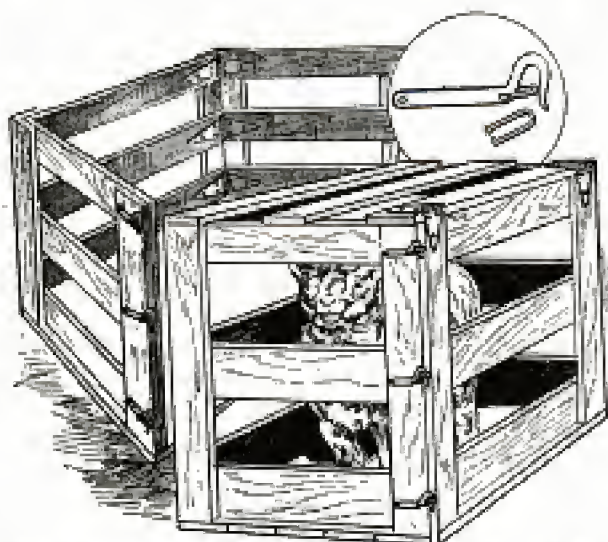
Portable Vacuum Cleaner for Shop

Sweeping up dust and dirt on floors and benches is rather difficult with a brush, and a portable vacuum cleaner will be found more satisfactory. Only the motor and fan of an old machine are used, two 5-ft. lengths of rubber hose being attached to the intake and a small salt sack to the outlet. A light handle can be made from heavy galvanized-iron wire, so that the cleaner can be carried about or hung up when not in use. An extension cord of suitable length is, of course, also provided. When the salt sack is filled it is thrown away. The rubber hose enables one to reach places inaccessible with a brush, and to remove dirt without picking up tools and small parts.—P. C. Grose, McComb, Ohio.

Improving the Long-Nose Pliers to Handle Small Round Work

When round work is to be handled, a pair of long-nose pliers can be adapted to the purpose by heating the ends of the jaws and bending them over a piece of round stock of suitable diameter. The jaws are then hardened and tempered to a straw color. —Darwin Harris, Grand Rapids, Mich.





The Sides and Bottom of This Crate Are Hinged Together So That It Is Collapsible

Collapsible Crate for Live Stock

For shipping live stock, collapsible crates have been found practical. The sides are hinged together at three edges while the fourth is provided with hooks to engage with screweyes. The top and bottom of the crate are also hinged and hooked to the sides. When the crates are empty, it is an easy matter to fold them up so that they will occupy very little space and permit quick handling. A coat of white paint adds to their durability and makes them more attractive, which makes a good impression on buyers. — R. A. Meeks, Mannville, Alta., Can.

Rear Auto Wheels Easily Removed

Removal of rear auto wheels on tapered axles is an easy task if the shafts have been given the proper treatment when the wheels are put on. Both the axle and wheel hub should be thoroughly cleaned, and a coat of clean engine oil is then applied. When it is necessary to take off the wheel again, run the retaining nut out flush with the end of the axle and strike the end a sharp blow with a heavy hammer. This will loosen the wheel.

Glycerine Used for Quenching

A mixture of approximately 75 parts of glycerine and 25 parts of water will be found satisfactory for hardening tools, when an intermediate quench between water and oil is needed. Another advantage of glycerine is that it has no odor.

If the cover is kept on the glycerine container when not in use, there will be no evaporation, and it will be as economical to use as the ordinary oil quench.

Surfacing Small Emery Wheels

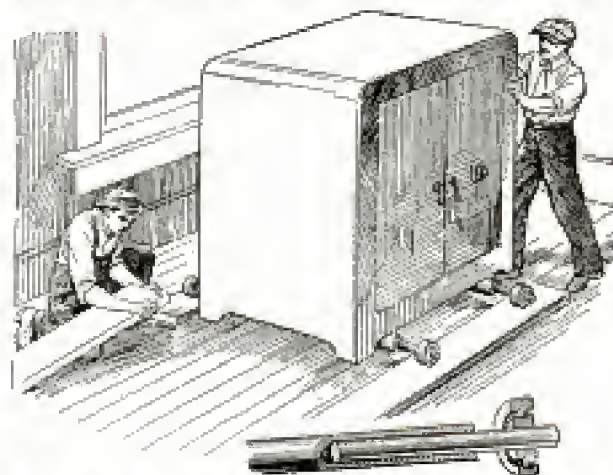
When no dressing tool is at hand, a small emery wheel can be surfaced with a steel table knife. The toolrest is adjusted $\frac{3}{4}$ in. from the wheel and the knife placed flat on the rest, with the end of the blade held against the wheel. The blade will vibrate and quickly dress the wheel down. — Joseph Minarovich, Berwyn, Ill.

How to Drive Nails into Hardwood without Splitting

Nails or screws will not split a small piece of hardwood if they are heated to a blue color and driven slowly into the wood. Another method is to drill a hole slightly smaller than the screw to receive it. — J. H. Beebe, Rochester, N. Y.

Ball-Bearing Rollers Used to Move Heavy Furniture

Heavy furniture, which is rather difficult to move in the usual manner, can easily be rolled on ball-bearing rollers. These are fitted on short lengths of steel rod, which are in turn slipped into the ends of lengths of pipe. In use, the assembly is placed under the object to be moved and planks are used to prevent marring the floor. Ball-bearing rollers can be obtained at almost any auto junk yard. — Rupert Anderson, Kearney, Nebr.



Moving Heavy Furniture Becomes Comparatively Easy with the Use of These Ball-Bearing Rollers

Protractor Scale and Concentric Useful on Lathe Chuck

Concentric circles on a lathe chuck, labeled with their respective diameters and circumferences, will be found convenient when laying out work. The circumference sizes make it easy to determine cutting speeds. A protractor scale on the chuck will also be helpful. The graduations on the chuck can be marked with a solution of copper sulphate and common salt, which is applied to grooves scribed in a layer of wax or paraffin.

Auto Radiator Quickly Cleaned

Radiators can be quickly cleaned with most of the compounds used for cleaning washbowls and sinks. Run the motor until the water is heated to the boiling point, then pour about half a can of the compound into the radiator. Allow the motor to continue running for about an hour to keep the water in constant circulation. Then drain and flush the radiator thoroughly.—A. H. Vance, Bensenville, Ill.

Spring Keeps Drain Cock Closed



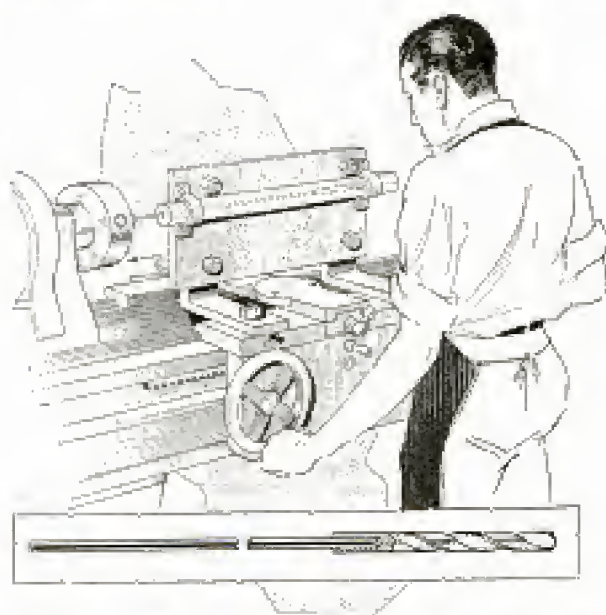
A length of $\frac{3}{4}$ -in. semi-spring steel can be formed into a lock to hold a drain cock closed. One end of the spring is doubled and a hole is drilled to fit over the threaded end of the cock, while the other end is slotted to straddle the cock handle. The spring is then bent and attached as indicated.

Knurling Round Work in a Shaper

Round work can be knurled in a shaper when it is not convenient to do it in a lathe. Insert the knurling tool in the holder, and place the work in a V-block, which is strapped to the shaper table. By turning the drive pulley by hand, a good knurl can be cut.

Anti-Rust Solution for Tools

Melt a mixture of tallow, 2 oz., and rosin, 1 oz., and strain the solution while hot. A thin coat of this applied to the tools with a brush will prevent rusting.



Improved Holder on Lathe Carriage Forms Extension Drill for Hollow-Drilling Shafts

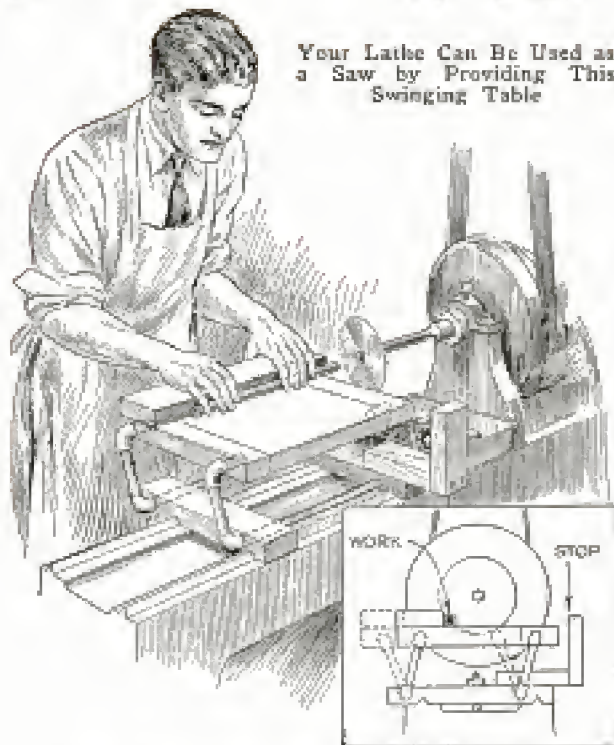
Hollow-Drilling Shafts

Long shafts can be hollow-drilled on a lathe by attaching a suitable holder to the lathe carriage. It consists of a piece of hardwood bolted to two angle brackets, which are in turn bolted to the lathe carriage, the exact method of attachment depending on the type of lathe. The work is held on the vertical plate by means of flat-iron straps. After being centered with a drill held in the chuck, run the drill into the stock. For this purpose an extension drill is needed, which consists of a rod of smaller diameter than the drill shank, sweated into a hole drilled in the latter, as shown in the lower detail.

Vise Clamp for Holding Small Parts

Small parts, such as screws and stove bolts, can be held in a vise without damaging the heads by using a clamp, consisting of a length of sheet steel bent to the shape shown. It is practically a rectangle with the butting edges filed to accommodate screws, and will be found especially useful for threading.





Swinging Saw Table for the Lathe

In small garages and other shops equipped with a lathe but not with a circular saw, the lathe can be used for sawing by providing a swinging table. It is made of 2-in. wood and pipe fittings. Two 2 by 4-in. pieces, a little longer than the width of the lathe bed, are notched to fit the ways and drilled for $\frac{1}{2}$ -in. pipe, as indicated by the dotted lines in the drawing. The crosspieces are clamped to the bed by means of blocks and bolts in the same manner as the steadyrest. Two lengths of $\frac{1}{2}$ -in. pipe, of equal length, are passed through the holes in the crosspieces, after which elbows and nipples are added to form two swinging members, which fit the saw table in the same way, although short nipples may be used here instead of single lengths of pipe passed entirely through the table. A crosscut guide is screwed to the edge of the table, and a stop is attached to one of the crosspieces to limit the forward travel of the table. It is comparatively easy to fit a saw on an arbor which can be held in the chuck, or a special mandrel can be made to fit the chuck screw, in which case, of course, the chuck is removed. In use, the table is arranged so that its edge just clears the saw and a pan can be placed on the ways under the saw to catch the cut-off pieces.—Leslie G. Roller, Sioux City, Iowa.

Simple Test for Auto Coil

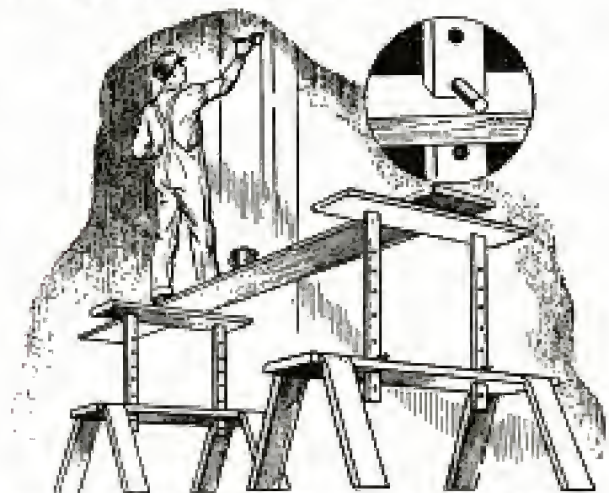
To test the coil on your auto-ignition system, fasten one end of an insulated wire to the frame or motor so that a good connection is made, and hold the other end within $\frac{1}{8}$ in. of the high-tension wire on the coil. Crank the motor by hand; if no spark appears between the two wires, and all connections are intact between the coil and battery, the coil is at fault.—August Jeffers, Bedford, Ind.

Grounding Static on Machines to Prevent Fires

Fire in machine shops, due to sparks caused by static electricity generated by belts and other moving apparatus, can be prevented by grounding the machines. One bared end of a length of No. 10 insulated copper wire is securely fastened to the machine, while the other end is attached to a copper plate, buried in charcoal or salt about 2 ft. under the ground.

Scaffolding Horses Are Adjustable for Height

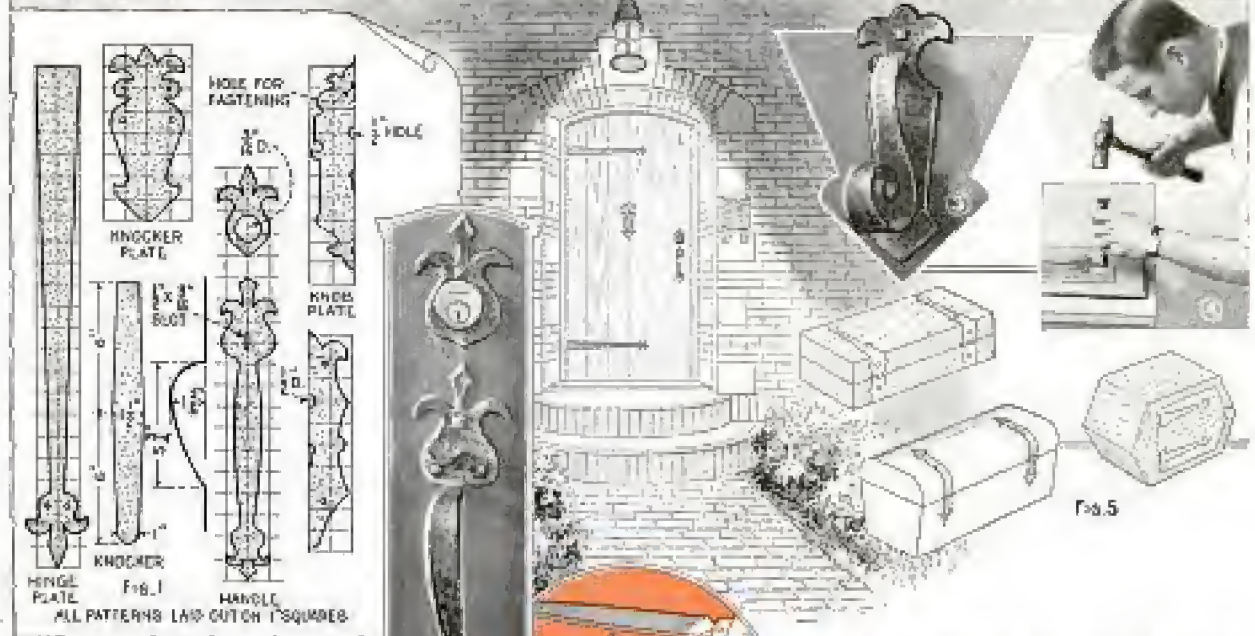
Those who do much overhead work, such as plastering, etc., will find a pair of adjustable horses to hold the scaffolding at any desired height, of considerable utility. The top members of the horses are made of 2 by 6, or 4 by 6-in. stock, and two rectangular holes are cut for the extension uprights, which are drilled at 2-in. intervals to receive pins. A crosspiece is nailed to the top of each set of uprights to support the scaffolding.



Holding the Scaffold at Various Heights, These Adjustable Horses Are Convenient for Overhead Work

Swedish wrought iron-
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HAND-WROUGHT HARDWARE



DRESSING up the oak doors with hand-wrought hardware calls for a handle, knocker and hinge plates to correspond.

One of the simplest types of hinge plates is pictured in Fig. 1, with accompanying trim to match shown in Figs. 2 and 3. The making of the hinge demands, first of all, a paper pattern ruled off in 1-in. squares on which the design is drawn. The completed pattern is transferred to the stock, which can be either $\frac{1}{8}$ -in. wrought iron, or $\frac{1}{8}$ -in. Swedish iron, which is of the same general malleability but of finer texture. Soft steel, which is considerably harder than either of the others but of fine quality and fairly practical for shaping "cold," can also be used. Brass and copper, too, produce beautiful effects. The design is first cut out with a hacksaw and cold chisel, as in Fig 4, and the edges are then smoothed with a file. Holes should be drilled through the hinge at the points indicated to take fastening nails, and as the door itself is not dependent on these fastenings, they may be held in

place merely with hand-forged pyramid-headed nails. These can be made quite simply by filing the heads of round-headed galvanized nails to obtain the proper shape, or by making dummy

heads from a $\frac{3}{8}$ -in. square piece of wrought iron, as shown in Fig.

6. The bar is first drilled lengthwise down the center, the end is filed to a pyramid shape and the filed portion then sawed off. The dummy head thus formed is held in place with a small finishing nail, after which the dummy head is lightly peened over the nail head to cover it.

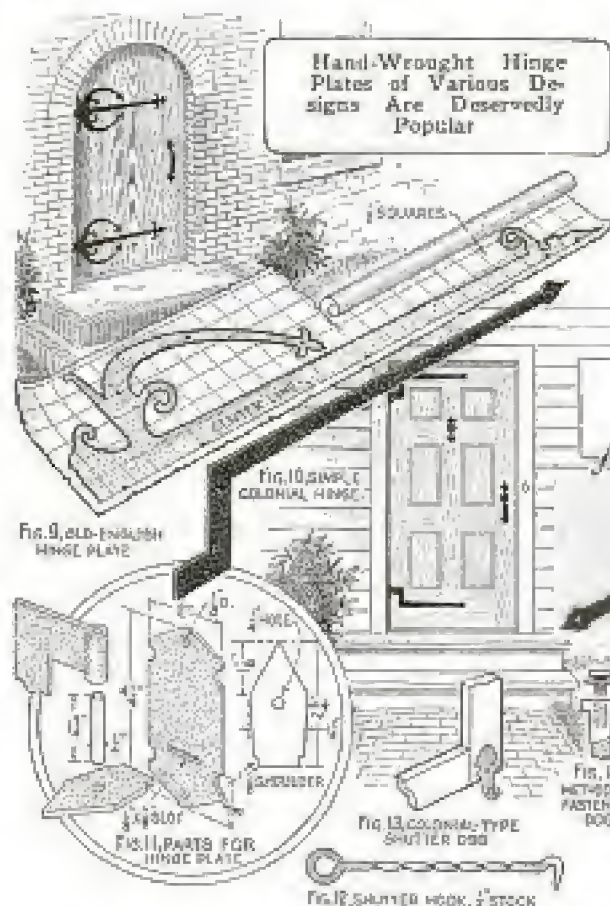
The door knocker to match this set of hinge plates is made from two pieces of $\frac{1}{8}$ -in. stock and shown in Fig. 3, while its pattern is given in Fig. 1. The bending from eye to curl can be done by working the stock on a flat surface with a hammer, as shown in Fig 7. The eye is hammered first; then, by gradual rolling from the smaller curves into the larger ones, the complete curl of the knocker is fashioned. The piece can then be slipped over a section of pipe and lightly hammered to take out bumps and hollows. Fig. 8 shows the assembly of the two

FIG. 6, MANNER OF MAKING DUMMY NAIL HEADS



FIG. 7



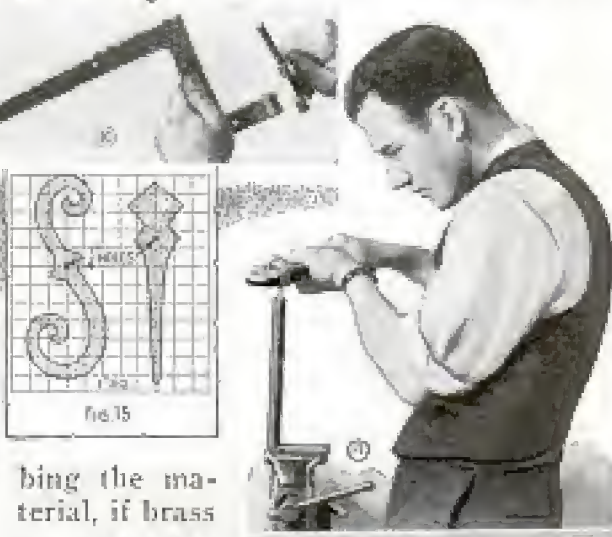


pieces, the knocker portion being held to the plate with a soft-metal rivet, fitting the turned-over portions of the plate. Like the hinge plate, the fastenings are fake nails, but these should be as long as possible in order that they may have greater holding power. Round-headed wood screws may be used throughout, if the heads are hammered down later. A door handle and plate, in a matching tulip design, to fit any standard cylinder lock are also shown. The handle portion of the lock proper is bent to shape and is rounded in the front, while the concave back can then be built up with solder hardened with antimony. If the handle is of the knob type, the knob should also be hammered, as in Fig. 18.

Other designs in door trim are equally feasible. The more ornate old-English hinge with accompanying hardware, as shown in Fig. 9, is particularly adapted to some homes, while the simpler colonial type, shown in Fig. 10, is well suited for either town home or lake-side cottage. Hinge plates for chests, toolboxes, etc., are shown in Fig. 5. Plain

or hammered brass, copper or aluminum may be used for these smaller items.

Finishing the hardware is often done by applying about three coats of linseed oil, burned off with each successive application, which blackens the metal. This is the best finish for exterior hardware. After the blackening process, the high spots are brightened by rubbing with emery cloth, and spar varnish is applied. Another popular finish is obtained by rub-



bing the material, if brass or copper, with fine powdered pumicestone, soap and water. This will leave the metal quite bright for a time, but it soon changes to a deep, rich bronze color. If desired, copper can be oxidized by dipping it into a mixture of liver of sulphur and water, brought to the boiling point. The pieces are then rinsed in clean water, after which a fine brush and pumicestone are used to slightly brighten the high spots.

It is quite practical to go a step farther and make actual working hinges, as shown in Figs. 11 and 16, for use on shutters and light doors. Attractive shutter dogs or "hold-backs," to match almost any design, are shown in Figs. 13 and 15. Both of these are cut from flat iron to the dimensions indicated, and are held in place with a 1/4-in. bolt, which is tapped into a lag screw, as shown in Fig. 14. The shutter-dog design in Fig. 13 should be made slightly concave so that the sharper edges will not mar the shutter. Hooks are also quite neces-



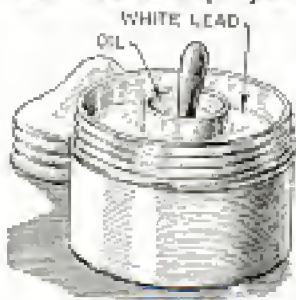
sary if a semi-adjustment of the shutters is desired. These are readily fashioned from $\frac{1}{4}$ -in. square stock, as shown in Fig. 12, while the twist can be made by means of a pipe wrench, with the stock inclosed in a $\frac{3}{8}$ -in. pipe to prevent kinking, as shown in Fig. 17. The eye and hook are formed later.

Replacing the Differential-Housing Gasket on Your Car

After the gasket in a differential housing has been removed, it can easily be replaced, without taking down the rear axle assembly, in the following way: Take out four of the bolts at the bottom and loosen the bolts at the top of the housing, allowing the grease to drain out, then clean the gap in the housing with a hacksaw blade or other similar tool. Put in as much of the gasket as you can and replace the bolts. The top bolts are then removed, and the housing raised with a jack to spread it apart at the top. The rest of the gasket can now be put in place and the bolts tightened.—Jos. C. Coyle, Englewood, Calif.

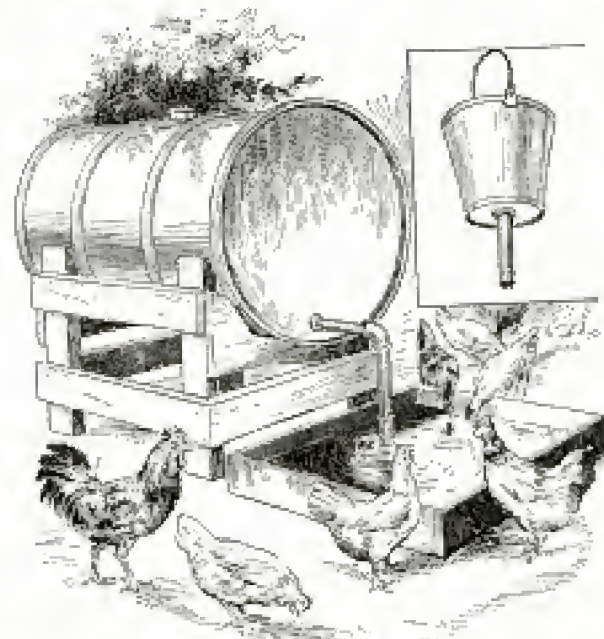
Paste Jar Holds White Lead

An old paste container of the "inner-well" type, will be found handy for holding white lead for frequent use. The inner well is kept partly filled with linseed oil, while the outer one contains the white lead. The paste brush is used to apply the lead. The cover should, of course, be kept on when the jar is not needed.



Graduated Toolrest Helps Turning Faceplate Work

Graduations on the toolrest of a wood-working lathe will be found helpful in turning faceplate work. They should be cut deeply enough to be easily seen. With the rest placed parallel to the face of the work, the correct distances for making cuts can readily be determined by holding the tool at the proper graduation on the toolrest.—H. C. Roberts, Urbana, Ill.



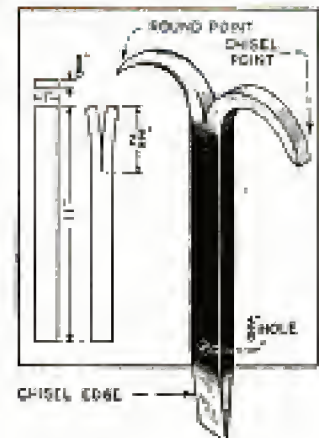
Poultry Watering Trough Consists of an Old Oil Drum Set on a Wooden Crib

An Automatic Water Fountain for Poultry

A large automatic water fountain for your poultry can be made from an old oil drum mounted on a sturdy wooden crib. Two pipe nipples and an elbow are assembled to fit the opening near the edge of one end of the drum as indicated. The outlet pipe is extended into a suitable trough and must be plugged or inverted when filling, after which the filler opening is closed with a plug and a rubber gasket to make it airtight. A bucket for filling the drum is shown in the detail.

Tool for Cleaning Horses' Hoofs

A tool that will be found handy for cleaning horses' hoofs or the lugs on tractor wheels can be made as follows: A length of iron, 11 by 1 by $\frac{3}{8}$ in. in size, is split at one end and bent to the shape shown, one end being ground to a round point and the other ends to chisel points. A $\frac{3}{8}$ -in. hole is drilled through the tool so that it can be hung up.—W. A. Whitfield, Lincoln, Nebr.





Water Siphoned from Pail through Rubber Tubing Waters Seed Beds in Greenhouse

Seed Beds Watered by Using Siphon

Where water pressure is not available, greenhouse seed beds, which are a trifle too high to be watered conveniently with a hand sprinkler, can be supplied with moisture as shown in the illustration. A pail filled with water is placed on a shelf above the beds and a length of rubber tubing, fitted with a suitable nozzle, conducts the water from the pail to the beds. The end of the tubing submerged in the water should be securely tied to the bail. An old funnel with a perforated piece of tin soldered over the wide end forms a good spray for this purpose and is especially handy as it is readily removable from the tubing.

Kerosene Dries Wet Ignition Wires

Ignition wires that are grounded by water getting on the distributor head or around the spark plugs, can be dried by spraying kerosene over them. If a spray is not available, a brush can be used. The kerosene, penetrating the dampened surfaces of the wires and other parts, forces out the water.

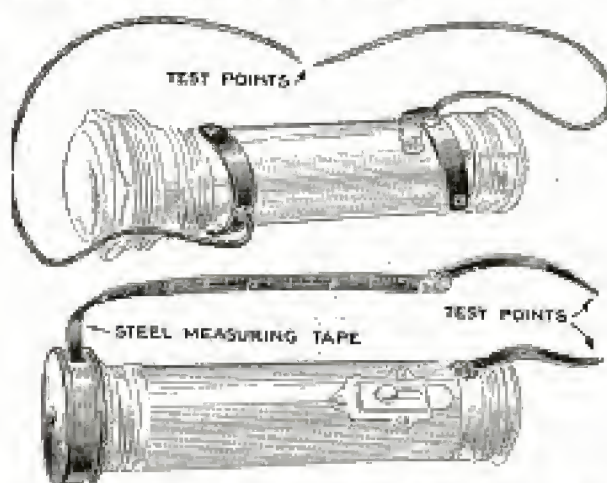
Heating Steel with a Torch

When using a torch to heat steel for bending or straightening, heat the thinnest portion first with the tip of a neutral flame. When it is red-hot, draw the torch away gradually and at the same time turn on both valves of the torch to the limit.

The hot steel will burn the fuel, making an intense flame against the surface of the steel. As it heats up, direct the flame toward the heavy parts. This flame is several times more intense than the neutral flame, and speeds up the work of heating the metal. In this way heavier work can be handled with one torch, keeping the torch and operator farther away from the heat.—Mart Banke, Detroit, Mich.

Flashlight Fitted with Test Points for Trouble-Shooting

For locating short and open circuits, a compact tester can be made from an ordinary flashlight fitted with flexible leads. The upper detail shows a flashlight having a fiber body and metal ends, which, when connected, light the lamp. Taking advantage of this type of construction, two U-shaped clips, fitted with pins to engage the rivets on the metal ends, are used, suitable lengths of flexible rubber-covered wire being soldered to the clips. In this way the testing leads can be removed at any time and do not interfere with the usefulness of the flashlight for other purposes. The second method is shown in the lower detail and in this case the testing leads are permanently attached. A short strip of spring brass is fastened to the metal sleeve in the lamp end with one rivet so that the front can be turned back over the body of the flashlight when not in use. A small spring-wound steel measuring tape, fitted with a test point, is attached to the other end. In use, the tape is unwound as needed.—Steffen Hundevadt, Chicago.



Pocket Flashlight Fitted with Test Points Forms Compact Trouble Shooter

PRACTICAL IDEAS TO LIGHTEN WORK ON THE FARM

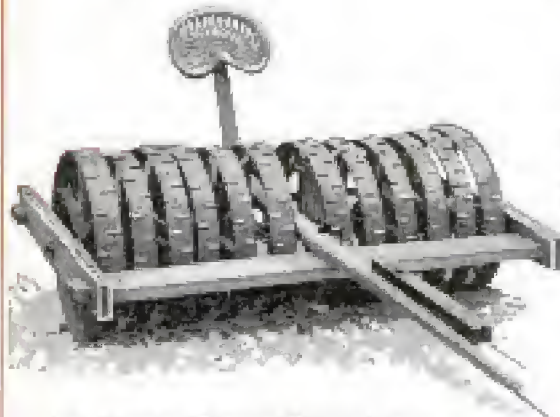


Homemade Mixer for Inoculating Soybeans on the Farm of Henry Marshall, Indiana

Below, Labor-Saving Method of Loading Feed on Wagons from an Overhead Storage Bin into Which It Is Blown



Wire Basket Fitted with Claws and Attached to a Long Pole Makes Fruit Picking Easy



Old Mower Wheels, Which Lay Around or Can Be Had for a Song, Make an Excellent Roller

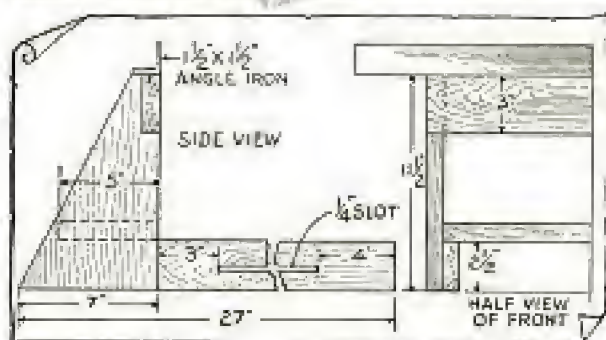
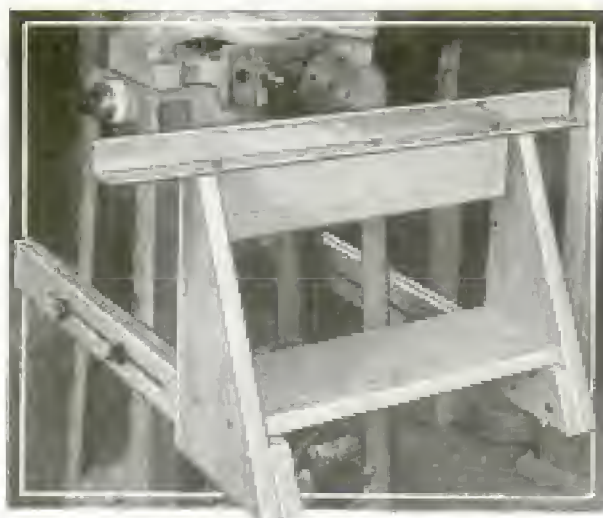


Tandem Milk Cooler, Hinged to Side of Milk House, Is Operated by the Windmill



Above, Wagon Wheel Forms Flywheel on Driveshaft of Farm Hoist; Left, Bushel Basket Fitted with Funnel Avoids Spilling Seed or Fertilizer, and Extension Boxes Increase Capacity of the Planter

similar -
Hambler - Russell
Worcester. Mass



Sturdy Wooden Toolrest Bolted to Home Utility Machine Enables Turning Large Work

Improved Toolrest for Turning Large Work on Boring Machine

Utility workshop machines of the combination types, which are equipped with a boring spindle, can be used for turning large disks if a suitable toolrest is provided. An adjustable rest for this purpose is shown in the photo, and consists of a wooden framework clamped to the machine frame by means of bolts and wing-nuts, and a length of angle iron screwed to the top. The exact dimensions of the framework will, of course, vary with the size and construction of the particular machine on which it is to be used, although the dimensions given in the detail convey an idea of its approximate size. The two lower rails, with which the toolrest is fastened to the machine, are slotted to allow horizontal movement in adjusting the rest of the work. A bolt is passed through each leg of the machine to engage with the slots of the rails, and, when the bolts are tightened by means of the thumbnuts, you may be sure that the rest is attached securely. A length of angle iron screwed to the top may extend a few inches beyond the rest.

Weight of Sales Slips Indicates Day's Receipts

A New York department store has found that by weighing the sales slips at the close of each day, a fairly accurate estimate of the daily receipts can be made. A separate slip is used for each transaction, and it was found that an average in dollars per ounce is obtained, which will run practically constant day by day. The estimate obtained in this way will be fairly close to the actual figure.

Lathe Chuck Holds Round Stock for Drilling

If there is no tool at hand to hold round stock when drilling on a drill press, place it in the chuck of a small bench lathe. As the bottom of the chuck is true, it can be set on the drill table, enabling the stock to be held firmly and accurately.

Rubber-Tired Wheelbarrow Fitted with a Brake

When heavy wheelbarrow loads are handled on grades, some kind of braking equipment is advisable. A good method is to replace the barrow wheel with the rear wheel of a bicycle or motorcycle, which comes equipped with a brake. It is an easy matter to extend a control wire to the handle so that it will be within easy reach. The fitting of the larger wheel may necessitate an extension on the barrow frame to hold it. Another advantage of having a large rubber-tired wheel is



Large Rubber-Tired Wheel on Wheelbarrow Equipped with Brake to Control Loads on Grades

that it does not sink into soft earth as readily as the usual iron wheel.—Myron Albertson, Jr., Los Angeles.

Dr. B. B. Black, 6042 Roy St.
Los Angeles, Calif.

POPULAR MECHANICS

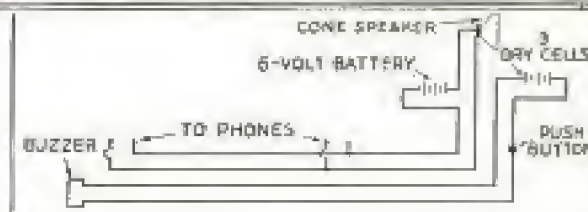
will furnish drawings for \$20.00.

PHONES AND DISH CARRIER IMPROVE RESTAURANT

345



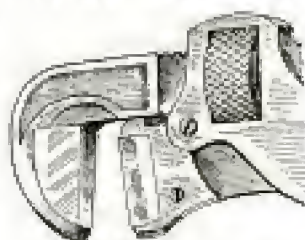
As the average lunch room and restaurant has very little space behind the counter, which results in more or less confusion during rush hours, an automatic conveyor system and a number of counter phones with which chef and waiters can communicate, will be great improvements. A pair of large wooden rollers are provided at each end of the conveyor, these being held in a suitable framework which permits them to rotate freely. An endless fabric belt is fitted over the rollers and is supported at intervals by means of smaller rollers, while an electric motor is belted to the lower roller in the kitchen. As the two sides of the belt move in opposite directions, one is used to convey dishes from the kitchen to the waiters, while the other returns empty dishes to the kitchen, a sloping platform being provided at this end to receive the trays if no attendant is at



hand, thus preventing damage. A similar platform should also be fitted at the front end of the conveyor. Two hand phones on the counter are connected to a 6-volt battery and a cone speaker located in the kitchen. With this arrangement, the waiters can talk to the chef, and he, in turn, can communicate with them by talking into the loud speaker. The buzzer at the counter is connected to a push button and dry cells in the rear, permitting the chef to signal the waiters, and the trays he sets on the conveyor carry numbered cards indicating for which waiter they are intended. The diagram shows the complete hookup.

Smooth Jaws for a Pipe Wrench

When it is desired to use a pipe wrench on a square or hexagon nut, spring-steel covers over the jaws of the wrench will afford protection for the nut. After annealing the steel, two pieces are cut out and shaped to fit tightly over the jaws as shown. Bend the edges of the pieces so that they will snap into the depressions on the sides of

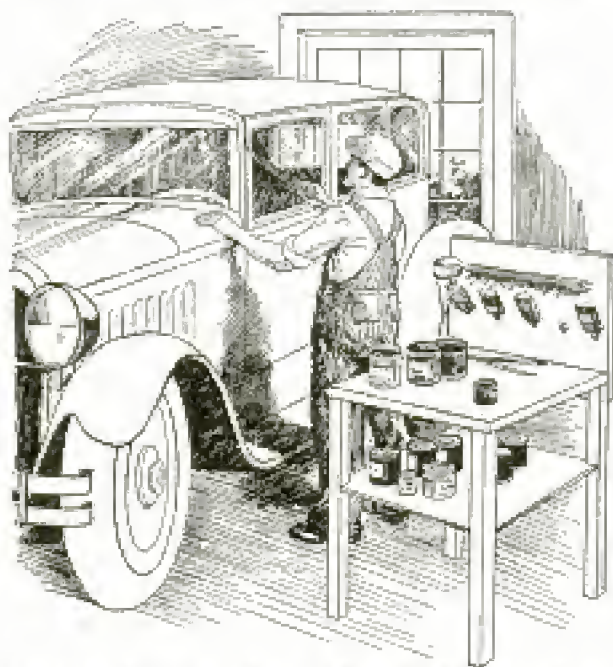


the jaws. After hardening, the covers are ready for use.

Steel-Polishing Powder and Oil Prevent Rust

Before storing a machine or tool, paint it with a solution of equal parts of tripoli powder and a good grade of machine oil. When the machine is to be used again, rub off the solution with a brisk motion.

☛ For speed in driving screws, cut off the blade of an ordinary screwdriver and fit it into the chuck of a breast drill.

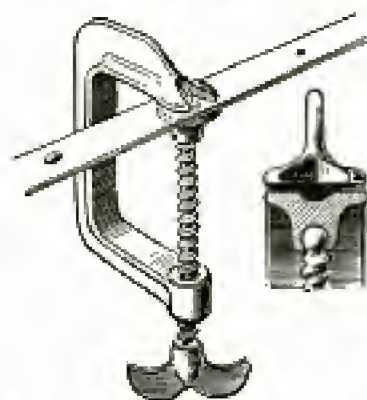


Small Table for Paints and Brushes Will Be Found Handy by Auto Finishers

Varnish Stand for Auto Finishers

Constructed of light wood, a small stand for holding paint and brushes will be found helpful to auto finishers. A board is tacked to the edge of the table to hold paintbrushes and other accessories, and one or more shelves under the top will increase the capacity. If desired, small casters may be fitted to the legs of the table so that it can easily be moved about from place to place wherever needed.—V. F. Clayton, Detroit, Mich.

C-Clamp Makes Riveting Easier



When riveting light work, a C-clamp, altered as follows, will be found helpful: Cut a V-notch in the foot of the clamp and counter-sink a small hole in the end of the screw. By placing the head of the rivet in this hole and tightening the clamp on the work, the rivet will be held firmly while being driven. It is advisable, of course, to support the clamp while hammering in order to avoid breaking it.

When riveting light work, a C-clamp, altered as follows, will be found helpful: Cut a V-notch in the foot of the clamp and counter-sink a small

Solution Prevents Peeling of Paint from Galvanized Surfaces

To counteract peeling of paint from pipes or other galvanized surfaces apply a solution of 2 oz. each of copper chloride, copper nitrate and sal ammoniac in 1 gal. of water. Prepare this in an earthenware container. Then slowly add 2 oz. of commercial muriatic acid. Let this dry for three hours before painting. The solution is harmful to the hands while wet but not after it has dried.

A Good Polish for Duralumin

Duralumin can be given a glossy finish with a solution consisting of equal parts of fine emery flour and machine oil, mixed to a heavy paste. Apply the paste with a circular rubbing motion and remove it with a soft cloth soaked in lard oil, after which the rubbed surface should be allowed to dry.

Holes Drilled in Tailstock Center Simplify Oiling

Two holes drilled in the tailstock center of a lathe will greatly simplify oiling when turning heavy work. Grind a $\frac{3}{16}$ -in. flat on the point of the center. Then anneal it so that a $\frac{1}{8}$ -in. hole can be drilled lengthwise to a depth of about 2 in. and a $\frac{1}{4}$ -in. hole in the side to meet the first. If desired, the outer hole can even be tapped for a grease cup, after which the center should again be hardened for service.



Stopping Rear-Wheel Grease Leak

When the axle housing of your car leaks at the rear wheels, replace the felt washer with one that has been thoroughly saturated with glycerine. As this substance does not emulsify, it provides a positive seal, preventing penetration of the oil.—Aaron H. Yonteff, Bronx, N. Y.

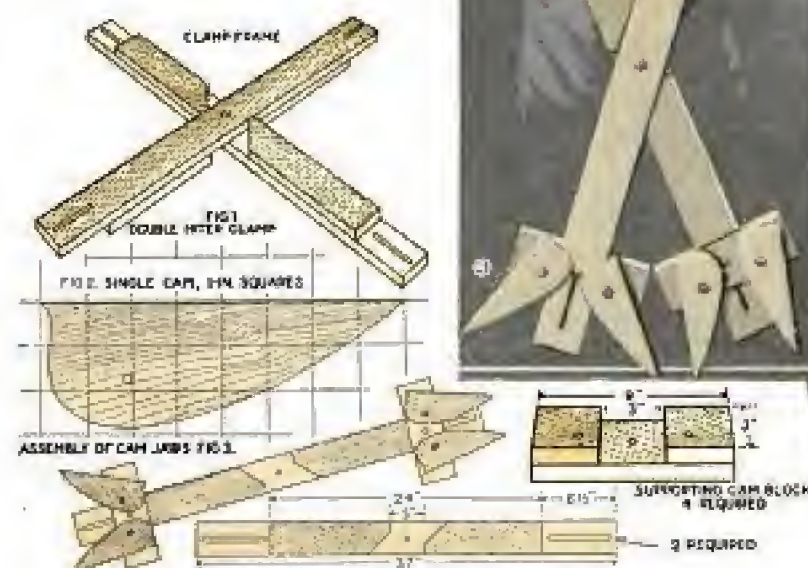
☛ A broken twist drill, ground to a blunt point, makes an excellent center punch.

Quick and Accurate Clamps for Miter Joints

IT IS comparatively easy to construct a clamp from seasoned hardwood that will successfully draw up a considerable range of sizes on plain mitered work. A simple miter clamp, which is designed to draw up all four miters of a square or rectangular framework in a single operation, is shown in Figs. 1, 2, 3, 4 and 7, while a clamp for a single plain mitered joint is shown in Figs. 5 and 6. In both cases the pressure is exerted by cam action.

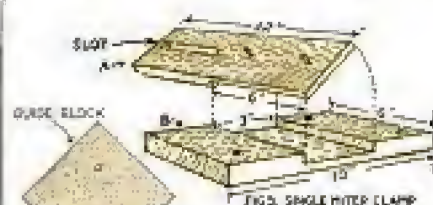
To make the first, eight small cams are cut from hardwood to the form and dimensions shown in Fig. 3. Strike off a template on 1-in. squares to the exact shape indicated. For heavy work, the cams should be

frame is given under Fig. 3, and clamps of these dimensions have an adjustment range on square work of approximately 18 to 26 in., and on rectangular work from 12 by 24 to 16 by 22 in. The clamp can be made larger or smaller if desired. To make the slots at the ends, drill two $\frac{3}{8}$ -in. holes, centered on the stock, $1\frac{1}{2}$ in. from the end and $3\frac{1}{4}$ in. from center to center. Then saw out the wood between the holes with a coping saw. From the same stock, ripped to the same width, cut four pieces, each $10\frac{1}{2}$ in. long. Measure $\frac{3}{4}$ in. from one edge at the end of each and



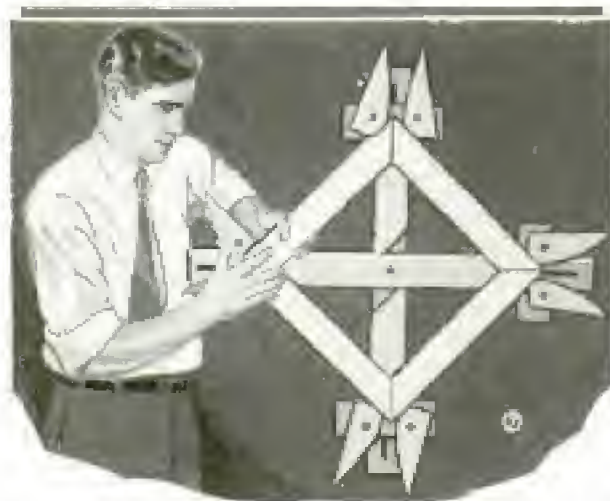
of 2 by 4-in. stock and the supporting frame of corresponding material, but for light work, 1-in. wood is sufficient. Each pair of cams must be exactly alike, and the binding edges must have a smooth even contour, besides being square with the flat faces. If the cams are made of 2-in. stock, they should be 4 in. longer than shown, in order to obtain the necessary leverage. Rivet, screw or dowel the cams through the grain of each cam, on each side of the bolt hole, to prevent splitting.

The dimensions of a single arm of the



from this point miter the corner. Screw these pieces on the longer arm as shown in Fig. 1. The ends opposite the mitered corners are cut square. Spread glue between the joining surfaces and screw together. Then drill a $\frac{1}{4}$ -in. hole at the exact center of the completed frame. Both arms are the same size in all cases and are fastened together with a $\frac{1}{4}$ -in. bolt through the center. Note that one arm is inverted over the other to provide a flat surface for the work.

The supporting block carrying the cams is shown directly under Fig. 4. Drill a



With This Double Miter Clamp, You Can Be Sure of Doing Quick and Accurate Work

$\frac{1}{4}$ -in. hole through the center of each. Set the cam blocks in place on the arms, and while holding the cams in their proper positions, mark the location of the holes in the blocks with a punch. Drill all holes with a $\frac{1}{4}$ -in. bit, and then assemble the cams on the blocks, remembering that the blocks on one frame piece must be inverted. Drive carriage bolts through from the underside and tighten the nuts on washers. When bolting the blocks to the frame, drive the bolts from the top.

To make the frame and guide block for the single miter clamp, two cams are made to exactly the same dimensions and contour as those in Fig. 1. The frame consists of pieces A and B, Fig. 5, the former being halved to the latter. Glue and screw these parts together and smooth the surface. Slot piece A, as shown, for $\frac{1}{4}$ -in. bolts. The triangular guide block is 3 by 3 in. in size with one side rounded. It must be cut square so that it will fit any miter joint perfectly. Before rounding off one side, strike a diagonal line across one face and, on this, mark two $\frac{1}{4}$ -in. holes for bolts. Locate the cams somewhat farther apart than on the double clamp. Drill two additional holes in piece B, so that the movement of the guide block, when setting for wider stock, may be compensated for by changing the position of the cams. This clamp may also be made heavier if desired. Four individual clamps made to the same dimensions form an excellent miter-clamping equipment for the individual shop where the work is almost certain to vary considerably in size.

Flashing-Metal Keys in Concrete between Pourings

When concrete is used for basement walls it is not always possible to obtain a good bond between pourings, if it is not all done the same day. The absence of a good bond permits water seepage, and this is, of course, highly objectionable. Here is a method that will overcome the difficulty: Before the concrete has been allowed to set after the first pouring, push strips of 6-in. flashing metal into the center of the wall, overlapping the strips and imbedding them about half of their width in the concrete. This will form a water-tight key if the concrete does not make a good bond.—L. H. Georger, Buffalo, N. Y.

A Wagon Skid for Steep Grades

Use of a channel-iron skid to brake his wagon on downhill grades, was found effective by a driver hauling heavy loads of dirt. The channel iron is drilled at one end to permit the attachment of a chain, which is securely fastened to the wagon by means of a hook slipped over a brace on the side. At the top of the hill, the skid is laid in front of one rear wheel, which is then run into it. This takes the wheel off the ground and pulls the chain taut. Sliding down on this skid retards the load sufficiently to make it easy for the team. Of course, the skid must be renewed occasionally due to wear on the bricks and concrete. At the bottom of



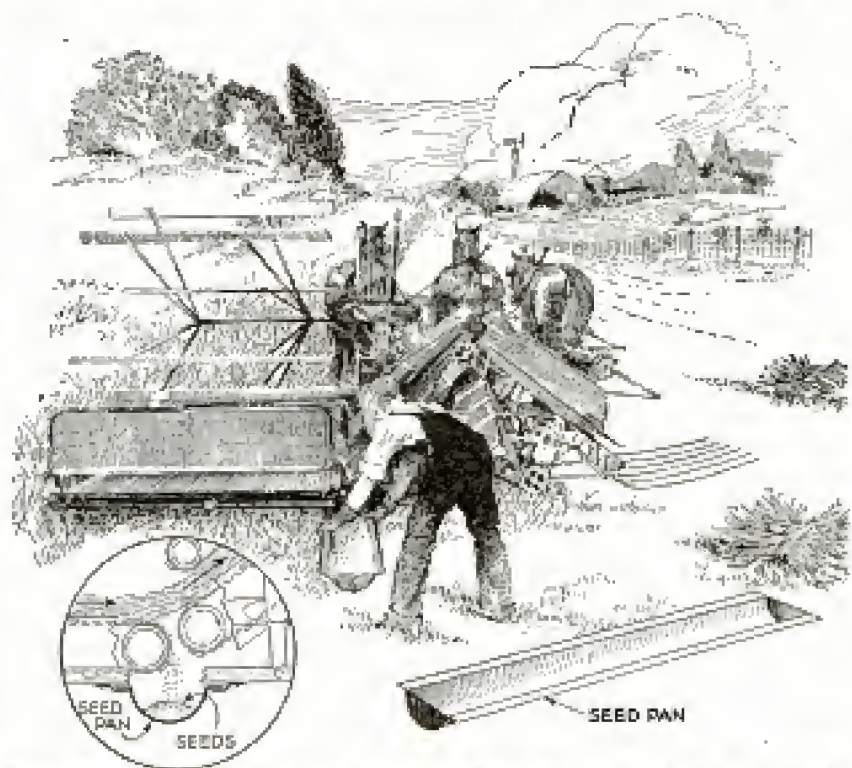
Channel-Iron Skid, Chained to Side of Wagon, Retards Heavy Loads on Steep Grades

the hill the skid is removed and thrown on the load.

☛ A small but strong chain is a good substitute for the top rung of your ladder, as it provides a good grip on trees and poles.

GROWTH OF WEEDS CHECKED WHILE HARVESTING

When cutting with a binder, ripe weed seeds are shelled by the reels and fall on the platform canvas from which they roll back to the ground through the opening between the platform and elevator canvases. Ripe seeds distributed in this way only cause a greater crop of weeds, and a good method of checking the weed growth by stopping this distribution of seed, is to provide a seed pan directly under the point where the platform and elevator canvases meet. Two lengths of angle iron are attached to the framework of the binder to hold a long sheet-iron pan, about 8 in. wide and 3 in. deep, the edges of which are slipped over the angle iron to keep the pan in place. A stop is provided at the front to prevent the pan from sliding forward, and a hook and eye at the rear will help hold it in place. Periodically the pan is emp-



Sheet-Metal Seed Pan on Farm Binder Collects Ripe Weed Seeds and Checks Further Distribution and Growth

tyed, and it is surprising how much seed will be collected in a day's cutting. The method of fastening the seed pan, of course, may be varied as desired, as long as it is placed under the edge of the platform canvas.

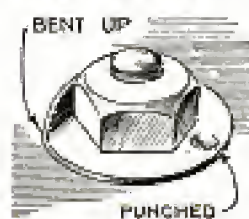
Thread-Cutting Oil Loosens Electric Motor Bearings

Motor bearings that have become "frozen," due to friction caused by gum forming on the bearing and shaft surfaces, can be loosened by applying thread-cutting oil. On motors that are equipped with oil rings and a reservoir, the lubricating oil is first drained out, and as the motor is started, thread-cutting oil is squirted into the slot on the top of the bearing, so that it flows into the bearing and around the shaft. The oil will quickly dissolve the gum, and will also polish the bearing and shaft surfaces. After the motor has run for a few minutes, drain off the surplus thread-cutting oil and flush the bearing with a good grade of lubricating oil. The drain plug is then put in place and the reservoir filled to the proper level. If the motor is equipped

with wicks and grease or oil cups on the bottom side of the bearing, it is necessary to turn the motor upside down, remove the cups and wicks and apply the oil to the shaft through the wick hole, after which the same procedure is followed as given above.—R. K. Beal, Marion, Ohio.

An Improvised Lock Washer

If a lock washer is not at hand, one can be quickly improvised from a small sheet-



metal disk with a hole drilled to fit the bolt, forming a large washer. Drive the nut down tight, bend the washer up against a flat side and make a deep punch mark in

the opposite side of the washer. This will prevent the nut from turning.



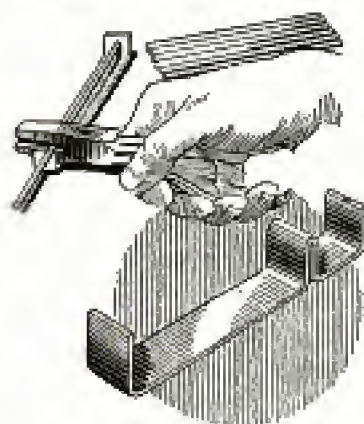
Small Brads and Tacks Are Always Ready to Hand When Kept in a Sliding Drawer of the Toolkit

Carpenters' Toolkit Has Tray for Small Parts

The usefulness of a carpenters' toolkit can be increased by fitting it with a tray for small parts as shown. Instead of using a round handle in the customary manner, a short $2\frac{1}{2}$ -in. strip of wood is screwed across the top, and cleats are nailed to the ends on the inside to support the tray, which is made by drilling large holes through a piece of 1-in. stock and nailing it to a $\frac{1}{4}$ -in. strip of the same size. A leather suitcase handle should be attached to the center of the top to carry the kit, and if desired, small hooks can be used to prevent the tray from slipping out of place when closed.

Wire-Cutting Gauge for Pliers

For cutting wire into short uniform lengths, this gauge, made from sheet metal, will be found useful. A strip of heavy



sheet metal is bent to fit the plier jaws, and the other end is bent at right angles to form a stop. In use, the wire is slipped between the cutters up to the stop.—D. W. Clark, Buffalo, N. Y.

Insects Killed with Glue

A new method of exterminating insects on evergreen trees about your home is suggested by experiments at the State University of Ohio, where it was found that a solution of glue and water was an excellent insecticide. The solution is made by mixing glue, 1 lb., and water, 5 gal. It is sprayed on the trees and holds the insects in the same manner as flies on sticky paper, without injuring the trees. Besides killing the insects, it also prevents their eggs from hatching.

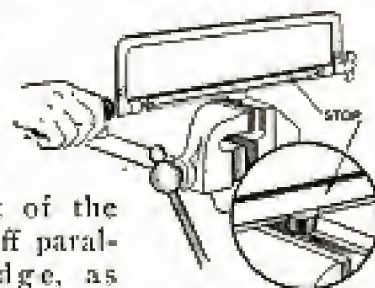
Auto-Radiator Hose Installed with Aid of Gasoline

When it is nearly impossible to slip a section of radiator hose over the connections, soak the hose in gasoline for half a minute, and you will find it can then be easily slipped on. The gasoline makes the hose slippery and allows it to stretch more. No damage will result to the hose from such treatment.

Hacksaw Stop for Slotting Screws

When cutting slots in screw heads, much time can be saved by using the illustrated gauge.

Place two blades in a hacksaw frame, one having the teeth and part of the blade ground off parallel to the edge, as shown in the lower detail, to serve the purpose of a stop.



This prevents the other blade from cutting too deeply and makes all cuts of uniform depth.

Imitating Walnut Wood

The appearance of walnut wood can be given to cheaper and more common white woods by painting or sponging them with a solution of potassium permanganate and warm water. One application of the solution will be sufficient for some of the woods, while others will need more to get the desired color. The permanganate is decomposed by the fiber of the wood,

forming peroxide of potassium on the surface. Wash off the excess potassium with clean water and allow the wood to dry, after which it can be varnished and polished in the usual way.

Checking Valve Tappets for Noise

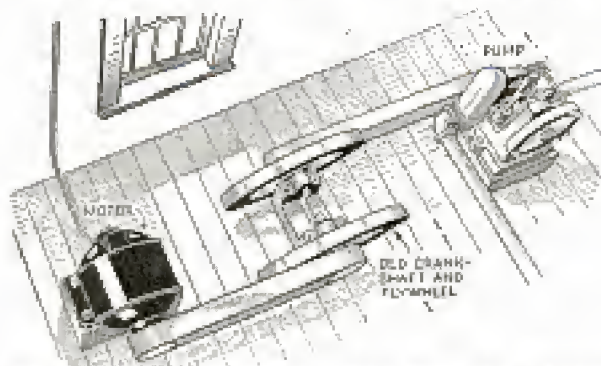
Valve-tappet noise in a gasoline engine is so similar to other noises that may be present, that it is sometimes rather difficult to determine the exact source. The tappet clearance can easily be checked while the engine is running by cutting several narrow strips of sheet metal of the proper thickness to fit the clearance space, where they are allowed to remain while the engine is running. If the noise is still present while these shims are used, one may be reasonably certain that it is not caused by loose tappets.

Cooling Overheated Saws

It is common practice to throw water on an overheated circular saw to cool it, but this may cause the saw to either crystallize or warp. The best remedy is to remove the cause of overheating, but if the saw must be cooled, allow it to continue running and apply machine oil to the sides with an oilcan. This will cool the saw slowly and without damage.

Old Engine Used as Flywheel

It has been found that the crankshaft and flywheel of a discarded gas engine, used as an equalizer between an electric motor and a pump, make the installation run more smoothly. The drawing shows



An Old Crankshaft and Flywheel Make an Efficient Equalizer for a Motor-Driven Pump

how the flywheel is belted between the motor and pump.



Pipe Extension on Post-Hole Auger for Boring Drainage Holes under Obstructions

Extension Auger Used for Boring Drainage Holes

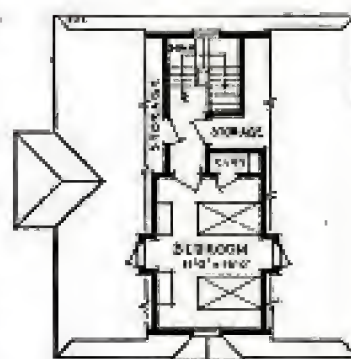
In drainage work on the farm, when it is necessary to tunnel under obstructions, an ordinary post-hole auger fitted with an extension handle of pipe and fittings will be found useful. The pilot is welded to the nose of the auger and should extend about 6 in. As many 4-ft. lengths of 1-in. pipe as will be needed, are held together with pipe couplings, and a tee with two nipples provides a suitable handle. In use, the auger is driven into the earth until the first extension is needed, which is then added and the work continued, more extensions being used as the work progresses.—R. F. Starzl, Le Mars, Ia.

Shellac Holds Handles on Tools

Tool handles that have a tendency to come off can be kept tight by filling the hole in the handle with heavy shellac. Heating the tang of the tool before it is pressed into place will cause the shellac to dry more quickly.

☛To restore the readability of an under-exposed blueprint, apply peroxide of hydrogen with a soft brush.

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Plan 4-A-14

SOMETIMES a single detail will lift a small home out of the commonplace. It is so with this one. The fine proportions, the Germantown hood, the well-spaced windows are all important considerations. Yet it is really the pleasing entrance, the small stoop and the side seats which suggest hospitality that differentiates it from most small houses.

There are other features of interest about the exterior. The dining alcove extension, the dormers which tend to make the roof planes interesting and add qualities of hominess so desirable in the small house.

The plan is of a popular type, with bedrooms grouped on one side, where they have privacy, and the living quarters arranged on the other. In the front is a small vestibule, always desirable in severe climates, and the ever-useful coat closet.

The fireplace in the living room is so located that a fire on the hearth may be enjoyed equally from the dining alcove. This means economy, too, since one chimney serves the flues from fireplace, range and furnace. In the kitchen there is cross-light and ventilation, and the room is planned to route steps and minimize labor.

The second floor may be finished at any time to provide a fine bedroom. This room will have light and air from three sides, together with a large closet, and there is room for additional storage space on this floor.

The Architects' Small House Service Bureau of the United States, Inc., was formed to furnish a complete and dependable small-house plan service at moderate cost. For information regarding the blueprints and specifications address the bureau at 1200 Second avenue, South, in Minneapolis, Minn., from which also a booklet, containing twenty-seven selected small-house plans, may be had for the price of 10 cents. The bureau is under the control of the American Institute of Architects.

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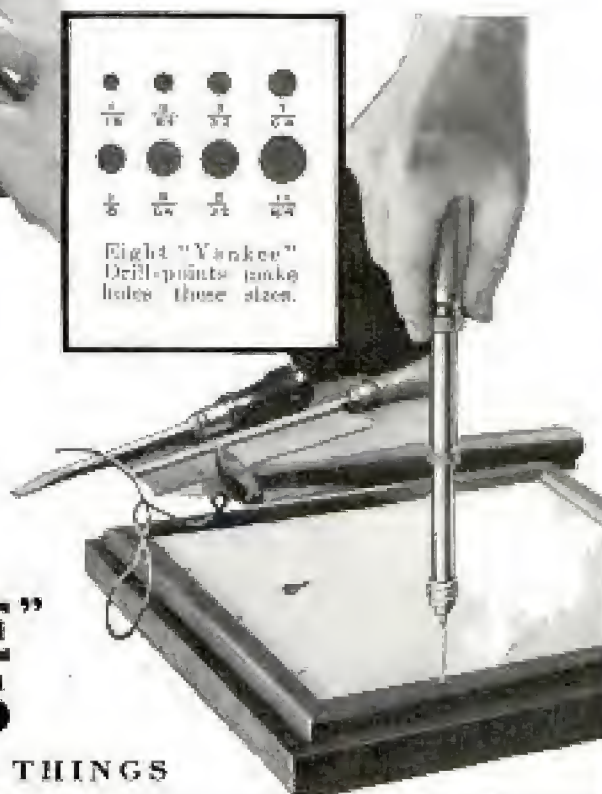


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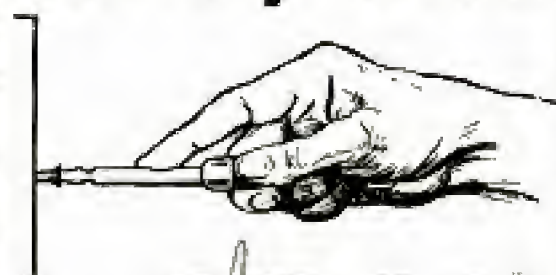


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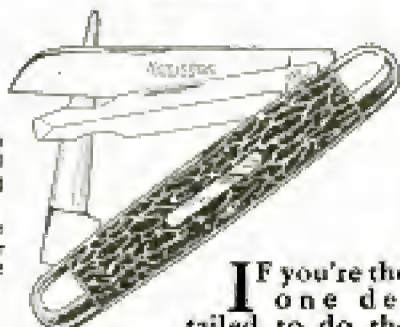
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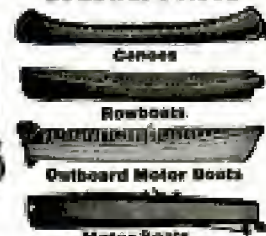
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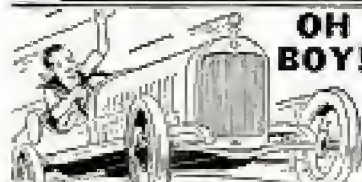
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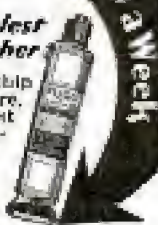
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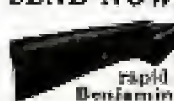
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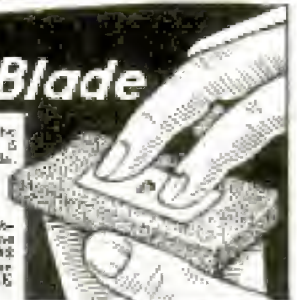
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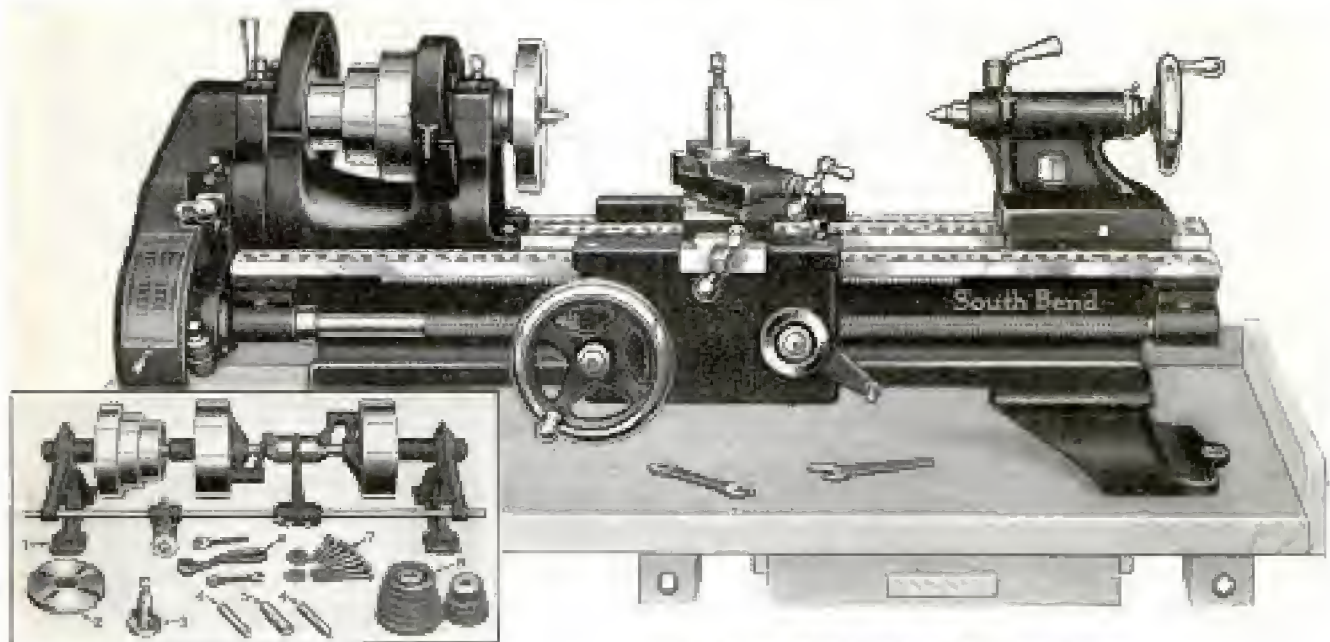


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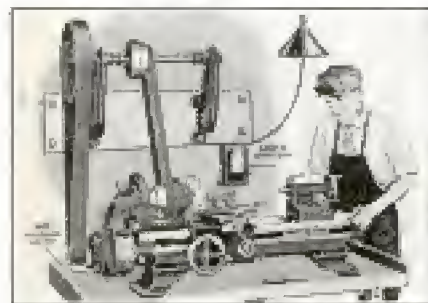
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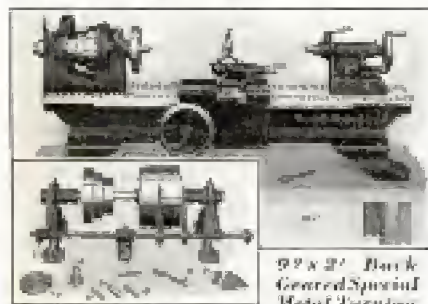


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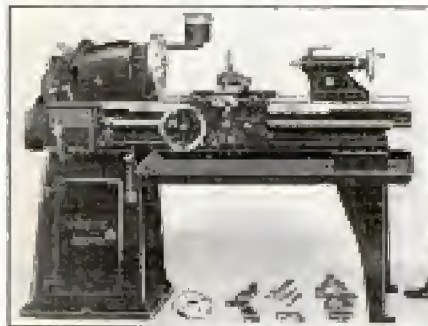
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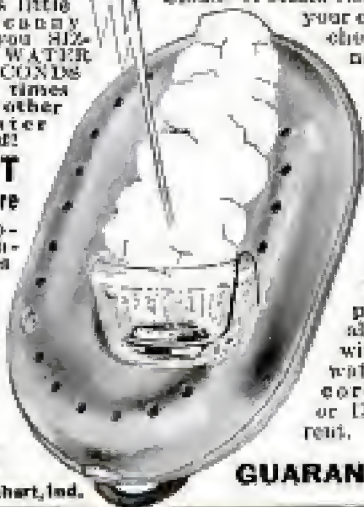
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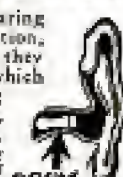


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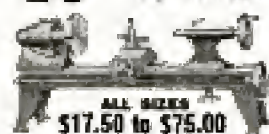
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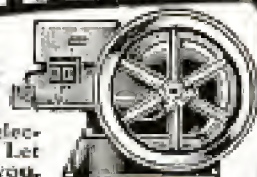
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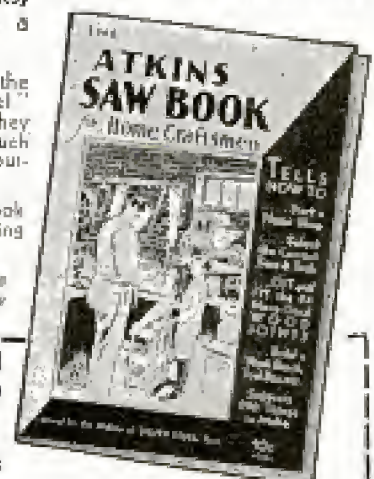
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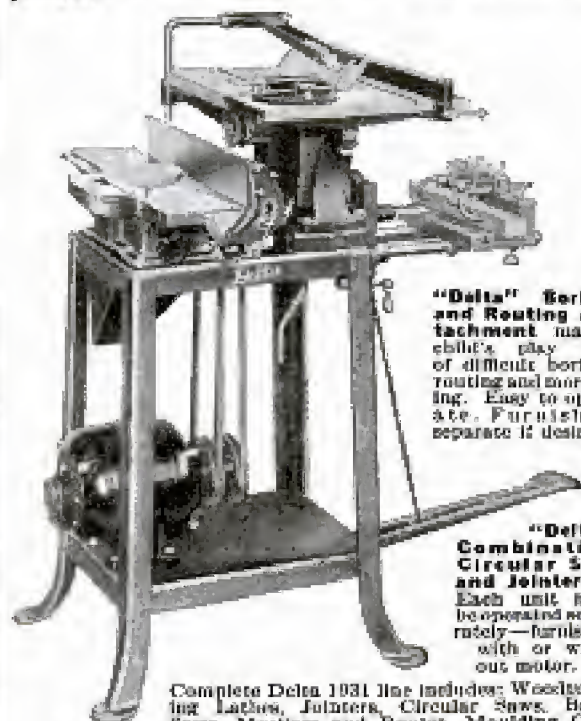
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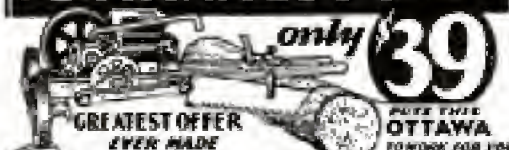
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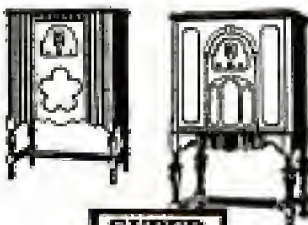
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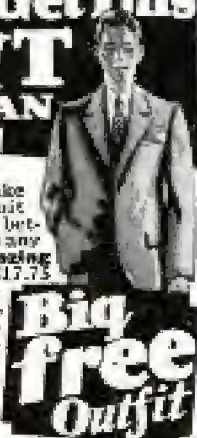
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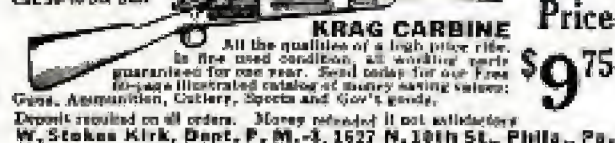
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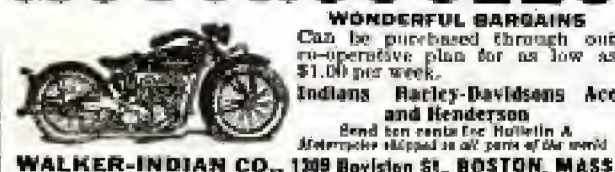


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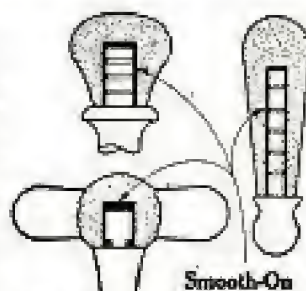
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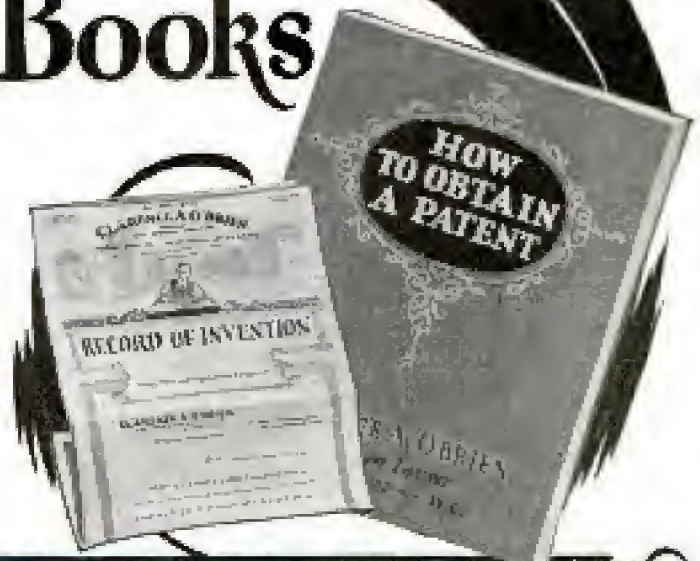
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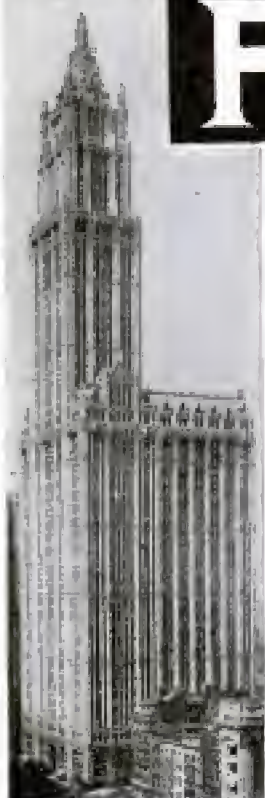
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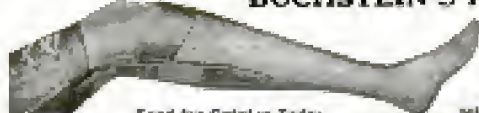
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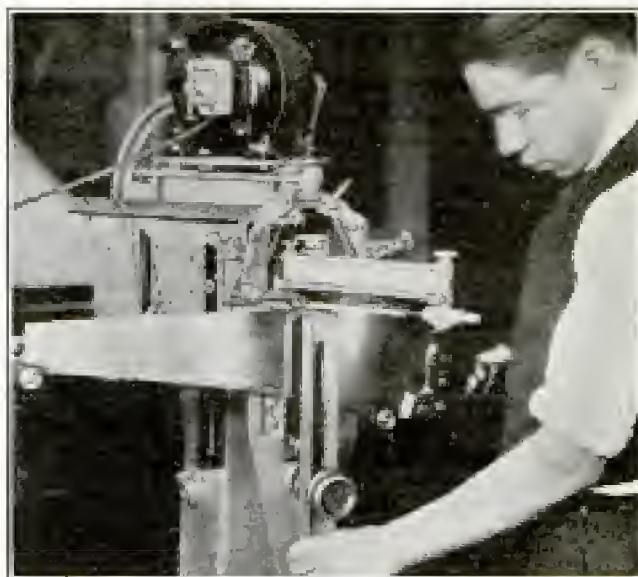
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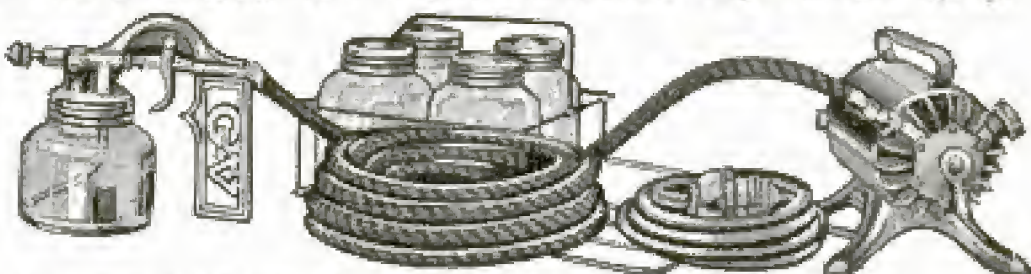
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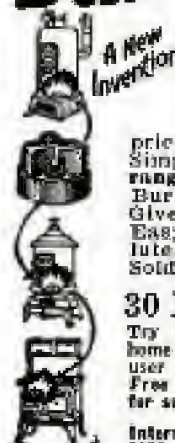
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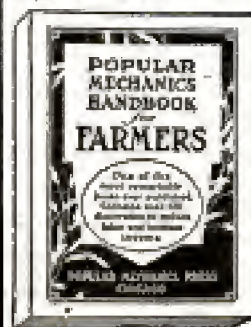
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**"Reach for a
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Now! Please!—Actually put your finger on your Adam's Apple. Touch it—your Adam's Apple—Do you know you are actually touching your larynx?—This is your voice box—it contains your vocal chords. When you consider your Adam's Apple you are considering your throat—your vocal chords. Don't rasp your throat with harsh irritants—Reach for a LUCKY instead—Remember, LUCKY STRIKE is the only cigarette in America that through its exclusive "TOASTING" process expels certain harsh irritants present in all raw tobaccos. These expelled irritants are sold to manufacturers of chemical compounds. They are not present in your LUCKY STRIKE. And so we say "Consider your Adam's Apple."



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